ISSN: 0216-3713

INDONESIAN AGRICULTURAL RESEARCH ABSTRACTS

Volume 29, No. 2, 2012

Ministry of Agriculture
INDONESIAN CENTER FOR AGRICULTURAL LIBRARY AND TECHNOLOGY DISSEMINATION
Jl. Ir. H. Juanda 20, Bogor 16122, Indonesia

ISSN: 0216-3713

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PREFACE

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Director of Indonesian Center for Agricultural Library and Technology Dissemination

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Impact of food price policy and monetary policy on macro economic stability. *Dampak kebijakan harga pangan dan kebijakan moneter terhadap stabilitas ekonomi makro/* Ilham, N. (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)); Siregar, H. *Jurnal Agro Ekonomi* (Indonesia) ISSN 0216-9053 (2007) v. 25(1) p. 55-83, 21 ill., 2 tables; 34 ref.

PRICE POLICIES; MONETARY POLICIES; ECONOMIC STABILIZATION; FOODS.

The relatively high share of food expenses in household expenditure indicates that contribution of food prices to the inflation rate is still quite high. Inflation and its fluctuations are important variables affecting macroeconomic stability. Therefore, stabilizing food prices, which could lead to a more stable inflation, might potentially result in a more stable macroeconomy. Food price policy might play important role in stabilizing food prices; but could also disturb the stability if implemented improperly. This paper aims at analyzing effects of food price as well as monetary policies on macroeconomic indicators. For this analysis, quarterly data of the period 1980.1 to 2004.4 were utilized. The study used a vector error correction model (VECM), from which impulse response function (IRF) analyzes were carried out. The results suggest that (1) food price policy could not cause instability of macroeconomy and (2) food price policy could not affect the unemployment rate, while monetary policy could do.

152 NURYANTI, E.

[Strategic value of palm oil industry]. *Nilai strategis industri sawit*/ Nuryanti, E. (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)). *Analisis Kebijakan Pertanian* (Indonesia) ISSN 1693-2021 (2008) v. 6(4) p. 378-392, 4 ill., 6 tables; 8 ref.

PALM OILS; OILS INDUSTRY; ECONOMIC VALUE; EXPORTS.

Palm oil industry is one of the strategic agricultural industries. Its prospect is shown by the increase of production in line with its demand. However, export tax policy discourages downstream industry development. The development of downstream industry is highly suggested to shift Indonesia's position from raw material-based exporter to processed product exporter. To increase the bargaining position in palm oil world market, Indonesia has to revitalize the upstream and downstream level of palm oil industry. Seed, fertilizer, and replanting activity are major issues in the upstream level, while, at the downstream level, the improvement is not only for infrastructure, but also incentive-offered policy investment. The existence of Indonesian Palm Oil Board has to be fully supported by an integrated research and development (RD) between the research institutes, universities, and the industries. Export taxes of palm oil and its products should be allocated to support the development of industries, to fund RD activities, and to provide safety net. The amount of export tax has to gradually decrease along with the level of palm oil process. The higher the process, the lower the amount of export tax. This policy could be considered as incentive to investor and encourage downstream development to create employment opportunity, reduce poverty, and improve the product competitiveness.

153 SUPRIADI, H.
[Strategy of agricultural development policies in West Papua (Indonesia)]. ***Strategi kebijakan pembangunan pertanian di Papua Barat***/ Supriadi, H. (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)). *Analisis Kebijakan Pertanian* (Indonesia) ISSN 1693-2021 (2008) v. 6(4) p. 352-377, 3 ill., 4 tables; 38 ref.

AGRICULTURAL POLICIES; AGRICULTURAL DEVELOPMENT; SOIL CHEMICOPHYSICAL PROPERTIES; HUMAN RESOURCES; FARMING SYSTEMS; FOOD SECURITY; POSTHARVEST TECHNOLOGY; AGROINDUSTRIAL SECTOR; BIOENERGY; IRIAN JAYA.

The acceleration of agricultural development in West Papua is a mandatory as indicated by the Presidential Decree (Inpres No. 05/2007) and in connection with the status of the West Papua as one of the poor provinces in the country. Poverty is particularly found in agricultural sector because of the limited infrastructures, lack of agricultural institutions, low skills and limited number of human resources, lack of investments, slow development of agroindustry, and ineffective marketing systems. SWOT analysis used in this paper indicates that West Papua Province has many potentials and opportunities to develop agricultural sector even within the existing weaknesses and external threats. The potentials include the availability of productive land although this potential is not supported by adequate infrastructure facilities and human resources. Investment is encouraged through partnership pattern and increasing export activities should contribute to the acceleration of agricultural development in this region. The serious threat to cope with is the impact of free trade and the competitive economic globalization. In this regard, the existing human resource quality, culture and tradition, and bureaucracy system are among the important aspects to deal with. The suggested policy strategies to accelerate the development of agriculture in West Papua are: (a) Increasing the production of estate crops and forest products to open export opportunity through partnership pattern program; (b) Improving extension system, agricultural infrastructure and export-import policies; (c) Carrying out conservation on land use and forest production; and (d) Inviting investment and developing topical transmigration to gradually overcome the shortage of qualified human resources.

E11 LAND ECONOMICS AND POLICIES

154 DARWIS, V.
Performance of the land ownership as main factor to determine farmer's income. ***Keragaan penguasaan lahan sebagai faktor utama penentu pendapatan petani/*** Darwis, V. (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)). [Proceedings of the national seminar on rural and agricultural development dynamic: challenge and opportunity for farmer welfare increase]. Prosiding seminar nasional dinamika pembangunan pertanian dan perdesaan: tantangan dan peluang bagi peningkatan kesejahteraan petani, Bogor (Indonesia), 19 Nov 2008/ Suradisastra, K.; Yusdja, Y.; Nurmanaf, A.R. (eds.). Bogor (Indonesia): PSE-KP, 2009: p. 158-175, 10 tables; 13 ref. 631.001.6/SEM/pc2

DUCKS; LAND OWNERSHIP; LAND UTILIZATION; AGRARIAN REFORM; LAND MANAGEMENT; SEED; FERTILIZERS; AGRICULTURAL PRODUCTS; FARM INCOME; SULAWESI; JAVA.

Land in this context is defined as land utilization, specifically for wet land as source of income. Currently, land conversion is high parallel with the population growth, the development of economy (external), and the family inheritance system (internal). The

consequence of this situation is the reduction of agricultural production and obviously the farmer's income. Regulations related to land preparation, which also means the availability of agricultural inputs have been released. However, a lot of problems are associated in actual condition of implementation. Using 2007 Patanas data, the relations of landholdings with income in West Java and South Sulawesi was analyzed. About 50% of the respondents were landless but most of their time was dedicated in agricultural activities. Only 29% of farmers with landholding 0.1 to 0.25 ha have main source of income from agriculture (West Java) and 24% (South Sulawesi). For farmers who hold more than one hectare is 79% in West Java and 52% in South Sulawesi. This means that the farmers' income is very much depending on the size of occupied and employed area. For self-sufficiency objective, it is suggested that the government considers problems in size of land employed at which agrarian constitution reform would be accounted.

155 SUHARDJO, M.

[Land management (soil and water) for increasing soil productivity and community empowerment at Yogyakarta (Indonesia)]. ***Pengelolaan lahan (tanah dan air) dalam upaya meningkatkan produktivitas lahan dan pemberdayaan masyarakat DI Yogyakarta***/ Suhardjo, M.; Mahening, R. (Balai Pengkajian Teknologi Pertanian Yogyakarta (Indonesia)); Syukur, A. [Proceedings of national seminar of technology innovation and agricultural institution in effort to improve community empowerment. Book 1]. Prosiding seminar nasional inovasi teknologi dan kelembagaan pertanian dalam upaya peningkatan pemberdayaan masyarakat. Yogyakarta (Indonesia), 24-25 Aug 2007. Buku 1/ Wardhani, N.K.; Mudjisihono, R.; Mashudi, M.F.; Jamal, E.; Wirianata, H.; Suroso; Hartati, R.M.; Hermantoro; Sayekti, A.S. (eds.) Yogyakarta (Indonesia): BPTP Yogyakarta dan BBP2TP, 2007: p. 237-245, 10 tables; 12 ref. 631.152/SEM/p bk1

ORYZA SATIVA; ARACHIS HYPOGAEA; ALLIUM ASCALONICUM; LAND MANAGEMENT; DRY FARMING; RICE FIELDS; SANDY SOILS; SOIL CONSERVATION; RESERVOIRS; SOIL CHEMICOPHYSICAL PROPERTIES; WATER CONSERVATION; EROSION; PRODUCTION.

Based on toposequence there was three kinds of land management. Since 2002, Yogyakarta AIAT was carried out the research on land management. The results of the research showed that long rorak (4 m length, 4 m distance between rorak) increased upland soil productivity, because the treatment maintained soil moisture. Application of zeolite as ameliorant on degradation wetland (rice field) also increased its productivity. Addition of soil ameliorants (clay and zeolite) increased either watering efficiency or yield.

156 SURIADIKARTA, D.A.

Potential tidal land for agricultural development. ***Jenis-jenis lahan berpotensi untuk pengembangan pertanian di lahan rawa***/ Suriadikarta, D.A.; Sutriadi, M.T. (Balai Penelitian Tanah, Bogor (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* (Indonesia) ISSN 0216-4418 (2007) v. 26(3) p. 115-122, 5 tables; 26 ref.

INDONESIA; LAND SUITABILITY; TIDES; SOIL TYPES; AGRICULTURAL DEVELOPMENT.

The area of tidal land in Indonesia is approximately 20.10 million ha, about 20-30% are suitable for agricultural development, and only about three million ha have been used for agriculture. Reclaiming tidal land requires a good planning and it should be done carefully

since the land has fragile structures and easy to damage. Through identification and characterization on these areas, delineation of each land potential (land typology) is obtained. Tidal land is generally dominated by peat soil and mineral soil which contain sulfide materials. Thin and moderate peat soils are suitable for cultivated areas which can be planted for vegetables, fruits, rubber, coconut, and oil palm tree. The thick and very thick peat soils are more suitable for forestry and conservation area. Mineral soils consist of potential acid sulfate soil, actual acid sulfate soil, and potential soil. The potential soil and potential acid sulfate soil are suitable for agricultural farm and paddy field. In addition, food crops, vegetables, fruit plants and annual plants can grow in these lands. Actual acid sulfate soil is better to be used for rubber, oil palm, and forestry plant.

E14 DEVELOPMENT ECONOMICS AND POLICIES

157 ILHAM, N.

[Technology profile of rice farming system and its implication on government roles]. ***Profil teknologi pada usaha tani padi dan implikasinya terhadap peran pemerintah/*** Ilham, N. (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)). *Analisis Kebijakan Pertanian* (Indonesia) ISSN 1693-2021 (2008) v. 6(4) p. 335-351, 5 tables; 12 ref.

RICE; FARMING SYSTEMS; TECHNOLOGY; GOVERNMENT; POLICIES.

Various programs continuously launched to fulfil the national rice demand, such as the optimization of the developed technology adoption. However, it is important to remember that the improvement of rice productivity is very much related to three components, namely, the use of high quality seed, the adequate amount of irrigation water, and the balanced application of fertilizers. The main problem in this context is how to provide the three components amid the shortage of government's budget. The aim of this paper is to analyze the farmer's attitude to adopt rice farming technology within the fluctuating inputs and outputs market along with the lessen trend of government support. This paper suggests priority efforts of the governments should conduct to achieve higher level of rice productivity and national rice production. The priority policy is to provide sufficient water through new irrigation development and improve the existing irrigation systems into an integrated upstream and downstream linkage. Moreover, the empowerment of the extension workers as supporting element to increase rice production is highly recommended.

158 ISWARI, D.

Sustainability index of development of citrus production center at Agam District, West Sumatra [Indonesia]. ***Indeks keberlanjutan pengembangan kawasan sentra produksi jeruk berkelanjutan di Kabupaten Agam, Sumatera Barat/*** Iswari, D.; Bey, A. (Institut Pertanian Bogor (Indonesia). Sekolah Pascasarjana. Jurusan Pengelolaan Sumberdaya Alam dan Lingkungan); Sutjahjo, S.H.; Poerwanto, R.; Seta, A.K. *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2008) v. 18(3) p. 348-359, 9 ill., 1 table; 19 ref.

CITRUS; AGRICULTURAL DEVELOPMENT; PLANTATIONS; AGROINDUSTRIAL SECTOR; SUSTAINABILITY.

The aim of the research was to elucidate sustainability index of citrus development at 5 dimensions. The key factors that affected sustainability were determined in order to formulate the policy recommendation for developing sustainable citrus production center. The results of the research indicated that the development of citrus production center in

Agam District was determined as unsustainable. The sustainability index was 49.56%, within range of 0 (bad) to 100% (good). The sustainability index of ecology and social dimension were 51.29 and 51.63%, respectively, which were determined as sustainable, while sustainability index of economic, technology, and institution dimensions were 48.02, 39.52, and 35.21% respectively, which were determined as unsustainable. There were 14 important factors affected sustainability. Four scenarios were built to develop policy recommendations of sustainable development of citrus production center. The recommendation was based on scenario IV that determined as short term by improving institutions dimension, medium term by improving ecology and social dimensions, and long term by improving economic and technology dimensions.

E16 PRODUCTION ECONOMICS

159 MA'MUN

Characteristics of potential essential oils. *Karakteristik minyak atsiri potensial/* Ma'mun; Suhirman, S. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Perkembangan Teknologi Tanaman Rempah dan Obat* (Indonesia) ISSN 1829-6289 (2008) v. 20(2) p. 110-121, 7 tables; 18 ref.

ESSENTIAL OILS; CHEMICOPHYSICAL PROPERTIES; IMPORTS.

Essential oils are widely used in preparation of medicine, perfume, cosmetics, food flavor, and aromatherapy. The need of essential oils increases in accordance with the development of food, cosmetical, and medicinal industries. Indonesia has been known as essential oil exporter, but also importer of several kinds of essential oils. The development of essential oils in Indonesia is not only aimed for export but also providing the raw materials for domestic industries. Several kinds of potential essential oils to produce are fennel, ginger, cardamom, kaffir lime, cinnamon, and mint oils. The characteristics of those oils are expressed in this paper.

E20 ORGANIZATION, ADMINISTRATION AND MANAGEMENT OF AGRICULTURAL ENTERPRISES OR FARMS

160 FARIYANTI, A.

Economic behaviour of vegetables farm household on price and production risk condition in Pangalengan Subdistrict of Bandung Regency [Indonesia]. *Perilaku ekonomi rumah tangga petani sayuran pada kondisi risiko produksi dan harga di Kecamatan Pangalengan Kabupaten Bandung/* *Fariyanti, A.* (Institut Pertanian Bogor (Indonesia). Fakultas Ekonomi dan Manajemen); Kuntjoro; Hartoyo, S.; Daryanto, A. *Jurnal Agro Ekonomi* (Indonesia) ISSN 0216-9053 (2007) v. 25 (2) p. 178-206, 9 ill., 4 tables; 10 ref.

VEGETABLES; FARMERS; HOUSEHOLDS; ECONOMIC BEHAVIOUR; PRICES; PRODUCTION; RISK; JAVA.

The farm households face many risks, especially, product price and production. The objectives of this study were to analyze the product price and production risk; factors incorporating the farm household economic behavior; and the effect of external factors on the farm household economic behavior under price and production risk. Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model was used to analyze the

production risk and simultaneous equation was used to analyze farm household economic behavior. This study was conducted at the production center of potato and cabbage in Pangalengan Subdistrict, Bandung Regency, West Java Province. The farm household economic behavior, especially, allocation of labor on off-farm and non-farm activity was responsive to product price and production risk. The increase of product price and production risk has negative effect on farm household economic behavior. Diversification and agribusiness insurance program can be an alternative to overcome production risk, meanwhile contract sale and storage infrastructure would be an alternative to overcome product price risk.

161 PRIYANTO, D.

Feasibility scale of pattern of sheep breeding farm to support farmers' income in rural areas. ***Target kelayakan skala usaha ternak domba pola pembibitan mendukung pendapatan petani di perdesaan/*** Priyanto, D. (Balai Penelitian Ternak, Bogor (Indonesia)). [Proceedings of the national seminar on rural and agricultural development dynamic: challenge and opportunity for farmer welfare increase]. Prosiding seminar nasional dinamika pembangunan pertanian dan perdesaan: tantangan dan peluang bagi peningkatan kesejahteraan petani, Bogor (Indonesia), 19 Nov 2008/ Suradisastra, K.; Yusdja, Y.; Nurmanaf, A.R. (eds.). Bogor (Indonesia): PSE-KP, 2009: p. 148-157, 4 tables; 10 ref. 631.001.6/SEM/pc2

SHEEP; BREEDING METHODS; FARMING SYSTEMS; FEASIBILITY STUDIES; BREEDS; FARM INCOME; POPULATION CHANGE; RURAL AREAS; RURAL SOCIOLOGY.

Sheep farming system in villages is managed in mixed farming model and based on available local resources and as an alternative low external input. Production management to support farmer income continually was not carried out yet, especially in determining sheep population scale which should be raised by farmers, so that sheep productivity could generate routine income. Research on sheep population target scale raised by farmer was conducted on 20 sheep farmers with structural survey. The objectives of the study were to obtain information on sheep farming productivity and determinant factors affecting sheep population scale. Result showed that scale of animal population in breeding model in village was 6.05 head/farmer, with number ewes raised was 2.35 head/farmer, and the average animal sold was 3.05 head/year. This activity can generate farmer income of Rp 776.315/year. Research showed that ewes population raised had generate positive relation respectively ($P<0.01$) with sheep population. It also showed that number of family, price of sheep, land ownership, and total farmer income were the determinant factors that could be recommended for developing sheep farming. On the other hand it showed that income from agriculture (horticulture) was competitive to the development of population scale, this were related to the allocation of family labour in the village. As recommended target that farmer should sell 1 sheep/month, the farmer should raised 9.08 ewes, and total population scale was 23.80 head, so it will be able to support farmer income of Rp 254.4212/farmer/month. The study showed that the farmers were willing to increase their sheep population, but was limited by their capital.

162 RUSDIANA, S.

Economic analysis of cassava-based male sheep fattening in rural areas. ***Analisis ekonomi penggemukan ternak domba jantan berbasis tanaman ubi kayu di perdesaan/*** Rusdiana, S.; Priyanto, D. (Pusat Penelitian dan Pengembangan Peternakan, Bogor

(Indonesia)). [Proceedings of the national seminar on rural and agricultural development dynamic: challenge and opportunity for farmer welfare increase]. Prosiding seminar nasional dinamika pembangunan pertanian dan perdesaan: tantangan dan peluang bagi peningkatan kesejahteraan petani, Bogor (Indonesia), 19 Nov 2008/ Suradisastra, K.; Yusdja, Y.; Nurmanaf, A.R. (eds.). Bogor (Indonesia): PSE-KP, 2009: p. 176-184, 4 tables; 12 ref. 631.001.6/SEM/pc2

SHEEP; MALES; FATTENING; COST BENEFIT ANALYSIS; CASSAVA; FEED CONSUMPTION; FEEDING SYSTEMS; WEIGHT GAIN; FARM INCOME; RURAL AREAS.

Raising sheep in rural areas is considered as additional source of income for farmers. Observation on male sheep fattening farm was conducted in Ciemas Subdistrict using two treatment models and a control system by putting the sheep in a coop for 4 months. Combination of cassava and its dried, wet and wilted leaves was given to feed the sheep once a day (morning). Additional feed was supplied with mixture of rice and barn, and waste of tofu for treated sheep. Meanwhile, only wide leaved grass and waste of agricultural commodity processing were prepared for control sheep. B/C ratio, mean test and regression were used to analyze the economic, average weight development and growth rate of sheep. The result indicated that the treatment sheep's fattening has significantly higher than the control sheep ($P<0.01$), similarly with its live weight rate (9.38 kg/head/4 months or 13 g/head/day for treated sheep compared to 5.59 kg/head/4 months for control sheep or 4.7 g/head/day). The study also revealed that profit earned from the fattening activity at a scale of 50 heads of sheep was Rp 12,000,890/period.

163 SETYONO, B.

[Potency and opportunity of local rice development at Sleman Regency, Yogyakarta (Indonesia)]. ***Potensi dan peluang pengembangan tanaman padi lokal di Kabupaten Sleman Daerah Istimewa Yogyakarta***/ Setyono, B.; Kristamtini (Balai Pengkajian Teknologi Pertanian Yogyakarta (Indonesia)). [Proceedings of national seminar of technology innovation and agricultural institution in effort to improve community empowerment. Book 1]. Prosiding seminar nasional inovasi teknologi dan kelembagaan pertanian dalam upaya peningkatan pemberdayaan masyarakat. Yogyakarta (Indonesia), 24-25 Aug 2007. Buku 1/ Wardhani, N.K.; Mudjisihono, R.; Mashudi, M.F.; Jamal, E.; Wirianata, H.; Suroso; Hartati, R.M.; Hermantoro; Sayekti, A.S. (eds.) Yogyakarta (Indonesia): BPTP Yogyakarta dan BBP2TP, 2007: p. 271-276, 3 tables; 5 ref. 631.152/SEM/p bk1

ORYZA SATIVA; PRODUCTION; GERMPLASM; FARMING SYSTEMS; ECONOMIC ANALYSIS; JAVA.

Local rice planting is germplasm conservation action, to avoid germplasm destroying. This research was conducted at Duwetsari, Padasan, Pakembinangun, Pakem, Sleman in 2006 and 2007 after adaptation experiments of some local rice. The research method used surveying method in farmer's land in the village. The result showed that there was potencial of local rice development, supporting by increasing farming area from 27,800 m^2 to 29,450 m^2 with the Cempo Merah local rice had high potency with its farming area reached out 265% (from 6,000 m^2 to 15,900 m^2). Local rice farming system was suitable and gained benefit B/C=1.14 gained by dry grain selling and B/C=1.23 gained by rice selling, so it had opportunity to be develop. Upon of this, local rice farming system had potency, opportunity to be develop and such as germplasm conservation action.

164 WALUYO

Integrated farming system in flood prone area in Sirah Pulau Padang Subdistrict, Ogan Komering Ilir District, South Sumatra Province [Indonesia]. ***Pola usaha tani padi secara terpadu di lahan rawa lebak di Kecamatan Sirah Pulau Padang Kabupaten Ogan Komering Ilir Sumatera Selatan***/ Waluyo; Suparwoto; Supartha, I W. (Balai Pengkajian Teknologi Pertanian Sumatera Selatan, Palembang (Indonesia)). [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.). Sukamandi: BB Padi, 2009: p.1583-1597, 6 tables; 5 ref. 633.18-115.2/SEM/i bk4

ORYZA SATIVA; CROP MANAGEMENT; FARMING SYSTEMS; INTEGRATED PLANT PRODUCTION; LAND PRODUCTIVITY; TECHNOLOGY TRANSFER; FARM INCOME; SWAMP SOILS; SUMATRA.

Flood prone in rainfed area provides enough potency to be developed in South Sumatra, but only small part of the area has been cultivated as an agricultural land. The main constrainsts of such flood prone areas were ecosystem factor particularly the unpredictable water fluctuation, cultural and technical factors, economic, social and institution. An effort to improve flood prone area was conducted through improving technology of specific site farming to improve the land productivity and increase the farmers' income. Research on the cultivation system in the flood prone area was conducted at Ampar of Sirah Pulau Padang Subdistrict, Ogan Komering Ilir, South Sumatra. The research is a year continuation activities as a mean to settle the technological model of specific location cultivation system through the use of pre-eminent adaptive varieties, balanced fertilizer, and integrated pest management. Pursuant to regional characteristic data and accessibility of the study location, hence Batu Ampar area enables to conduct a study of the rice cultivation system. Result of the study indicated that the pre-eminent varieties of IR-64, IR-42, Sei Lalan, and local when fertilized by 100 kg/ha urea, 100 kg/ha SP36, and 100 kg/ha KCl, yielded 4.0-5.0 t/ha. Analysis on the cultivation system at each model indicated that with the introduction of the technological model, earnings were equal to Rp5,369,550 (model I), Rp l2,780,000 (model II), Rp 4,400,000 (model III), and Rp 3,300,000 (model IV). These earnings were higher as compared to earnings of the farmers of non-cooperator. The development needs further research to measure the system and evaluate the water fluctuation in the flood prone areas. As a whole this study proved to improve the grain yield and increase the farmers' income in the flood prone areas.

165 YUHONO, JT.

Analysis on income and competitiveness of vetiver farming system in Garut District. ***Analisis pendapatan dan daya saing usaha tani akar wangi di Kabupaten Garut/*** Yuhono, JT (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* (Indonesia) ISSN 0251-0824 (2008) v. 19 (2) p. 197-215, 4 tables; 21 ref., Appendices.

VETIVERIA ZIZANIOIDES; ESSENTIAL OIL CROPS; FARM INCOME; FARMING SYSTEMS.

A study on the analysis of comparative and competitive advantages of vetiver oil was conducted in Garut District since July to August 2007. The objectives of this study were to evaluate the vetiver farmer income, comparative and competitive advantages in the

international market. The research used survey method. The analysis on the comparative advantages used pseudo price while on the competitive advantage applied the actual price. The data collected were analysed by using the input - output analysis, benefit cost ratio and domestic resource cost (DRC) analysis. Two villages were established at the center of vetiver development and industry namely Sukamukti and Sukakarya Villages. The results showed that the net profit achieved by the monocultural vetiver farming system at Sukamukti Village was Rp 12,417,500/ha and Rp 11,047,500/ha/year with the B/C ratio of 1.8. The DRC analysis of vetiver oil distilation at Sukamukti and Sukakarya Villages showed that there were comparative and competitive advantages. The data above indicated that export-oriented of vetiver oil industry needs a smaller DRC compared to export cost. To produce US $ 1 devisa for the country, it is required DRC values of Rp 6,257.77 at Sukamukti and Rp 7,616.77 at Sukakarya. The DRC coefficient is 0.6987 and 0.8344 or less than at Sukamukti and Sukakarya Villages, respectively.

E21 AGRO-INDUSTRY

166 INDRAWANTO, C.
Assortment of patrons of cashew agroindustry development. *Penentuan pola pengembangan agroindustri jambu mete/* Indrawanto, C. (Pusat Penelitian dan Pekembangan Perkebunan, Bogor (Indonesia)). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2008) v. 14(2) p. 78-86, 4 ill., 5 tables; 15 ref.

ANACARDIUM OCCIDENTALE; AGROINDUSTRIAL SECTORS; ANALYTICAL METHODS; INDUSTRIAL DEVELOPMENT; PRODUCTION; FARM INCOME.

As a cashew producer, Indonesia's cashew agroindustry has not been developed yet. Around 36 % of cashew production is exported without being processed. Therefore, a proper patron of cashew agroindustry development should be found. This research used system approach by AHP method to judge the best scenario of the patron of cashew agroindustry development. Acquisition of expert judgement had been done by intensive interview and FGD to seven experts in Bogor in February 2007. The analysis showed that raw material of cashew supply was the most important determinant factor in developing cashew agroindustry. Performance of this factor depended on the performance of farmers in managing their farming. This condition put farmers as the most important actor in developing cashew agroindustry. The performance of the farmers depends on how the scenario can fulfill the objectives of the farmers. From three scenarios judged, cashew agroindustry based on home industry in cashew production center regencies was the best scenario that can fulfil all objectives of the farmer. Policies should be taken in developing cashew agroindustry using this scenario were building clusters of the cashew industry in cashew production center regencies. Increasing farmers income from their farming by introducing good farming systems, intercropping, product diversification of cashew and increasing cashew nut export to importer countries such as Australia, Japan, Uni Emirate Arab and Saudi Arabia.

E70 TRADE, MARKETING AND DISTRIBUTION

167 FITRIADI, F.
Income and marketing analysis for organic rice with system of rice intensification (SRI) method: a case study at Sukagalih Village, Sukaratu Sub-district, Tasikmalaya Regency. *Analisis pendapatan dan pemasaran padi organik metode System of Rice*

Intensification (SRI): kasus di Desa Sukagalih, Kecamatan Sukaratu, Kabupaten Tasikmalaya/ Fitriadi, F.; Nurmalina, R. (Institut Pertanian Bogor (Indonesia). Fakultas Ekonomi dan Managemen). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia) ISSN 1410-959X (2008) v. 11(1) p. 94-103, 2 ill., 3 tables; 8 ref.

ORYZA SATIVA; ORGANIC AGRICULTURE; FARM INCOME; INTENSIFICATION; MARKETING; COST BENEFIT ANALYSIS.

This research was aimed to analyze income and marke ting of rice farming organic in Sukagalih Village, Sukaratu Subdistrict, Tasikmalaya. Qualitative and quantitative analyses were used as analytical method. Qualitative analysis was done to discuss the structure and marketing channel. Quantitative analyses consisted of farming profitability and R/C. Result of this research indicated that R/C to total costs of farming using System of Rice Intensification (SRI) method were higher than that of conventional rice farming, and R/C of farming operated by landowners were higher than that of tennant farmers. Result of marketing channels and market structure analyses showed that the marketing channel 4 (farmer, PPTD, PBLD, retailer and consumer) was the one that were more practiced compare to the other channels.

E80 HOME ECONOMICS, INDUSTRIES AND CRAFTS

168 AGUSTIAN, A.

Analysis of income proportion and expenditure of rice farmer household in several agroecosystems. ***Analisis proporsi pendapatan dan pengeluaran rumah tangga petani padi pada beberapa agroekosistem/*** Agustian, A.; Ilham, N. (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)). [Proceedings of the national seminar on rural and agricultural development dynamic: challenge and opportunity for farmer welfare increase]. Prosiding seminar nasional dinamika pembangunan pertanian dan perdesaan: tantangan dan peluang bagi peningkatan kesejahteraan petani, Bogor (Indonesia), 19 Nov 2008/ Suradisastra, K.; Yusdja, Y.; Nurmanaf, A.R. (eds.). Bogor (Indonesia): PSE-KP, 2009: p. 135-147, 5 tables; 11 ref. 631.001.6/SEM/Pc2

ORYZA SATIVA; FARMERS; HOUSEHOLDS; FARM INCOME; CONSUMER EXPENDITURE; DATA ANALYSIS; AGROECOSYSTEMS; FOOD SECURITY; FOOD CONSUMPTION; WETLANDS; JAVA.

The aim of this research is to analyze proportion of income level and expenditure of rice farmer's household in various agroecosystems in West Java and Central Java Provinces. The research was conducted in 2007 and its analysis used quantitative and qualitative approaches. The results of the research were: (1) the average agricultural land ownership of rice farmers in irrigated wetland and non-irrigated wetland agroecosystems of above 80% was at < 0.5 ha, such as in Grobogan, Blora, and Cianjur Regencies; (2) The average income of rice farmers in various agroecosystems that comes from agriculture was in balance with that from non agriculture (average proportion, 47.40% - 54.10% vs 45.90% - 50.0%), respectively; (3) The share of rice farm activities on income is the largest (>30%); (4) The average household expenditure on food was mostly for basic foods (cereals, roots, and noodles) and varied according to food types and agroecosystems; (5) Share of expenditure of basic foods in non irrigated wet land area was lower than that of irrigated wetland area, except in Grobogan Regency; (6) Proportion of agricultural household expenditure for nonfood consumption varied between locations, and expenditure for energy consumption, such as electricity, gasoline, and expenditure for education and health was relatively high; (7) The mentioned

results indicated that farmers' awareness on the importance of education and health is increasing for the future of the family members, so that they could reduce expenditure of others to compensate expenditure on the increasing education costs.

F01 CROP HUSBANDRY

169 BARIROH, N.R.
[Utilization of fermented cattle urine on tomatoes plant growth in pot culture]. ***Pengaruh fermentasi urine sapi (FUS) terhadap pertumbuhan tanaman tomat yang dibudidayakan dalam pot***/ Bariroh, N.R.; Sulistyono, I.; Nurbani; Pebriyadi, B. (Balai Pengkajian Teknologi Pertanian Kalimantan Timur, Samarinda (Indonesia)). [Proceedings of national seminar of technology innovation and agricultural institution in effort to improve community empowerment. Book1]. Prosiding seminar nasional inovasi teknologi dan kelembagaan pertanian dalam upaya peningkatan pemberdayaan masyarakat. Yogyakarta (Indonesia), 24-25 Aug 2007. Buku 1/ Wardhani, N.K.; Mudjisihono, R.; Mashudi, M.F.; Jamal, E.; Wirianata, H.; Suroso; Hartati, R.M.; Hermantoro; Sayekti, A.S. (eds.) Yogyakarta (Indonesia): BPTP Yogyakarta dan BBP2TP, 2007: p. 121-123, 4 tables; 5 ref. 631.152/SEM/p bk1

LYCOPERSICON ESCULENTUM; CULTIVATION; CATTLE; URINE; ABBATOIRS; PRODUCTIVITY; POT CULTURE; FARMYARD MANURE.

Cattle urine is one of animal husbandry wastes that its availability is ignored, whereas in fact cattle urine has higher nitrogen and kalium compared to those of its faeces. Fermented cattle urine has higher mineral content than those of pure cattle urine, so it may increase the production of vegetable, such as tomato. This study was conducted in East Kalimantan AIAT greenhouse from February - May 2007. There were 2 treatments with 6 replications. Treatment 1 (T1) = liquid fertilizer that consisted of effective microorganisms and treatment 2 (T2) = fermented cattle urine. Population of tomato was 120 trees. The result showed that plant height (112 days) gave significant result in T2 than that of T1. Ecocomic analysis of T2 was Rp 11,500/liter, cheaper compared to T1.

170 DJAUHARIYA, E.
Technology status of java long pepper. ***Status teknologi tanaman cabe jamu (Piper retrofractum Vahl.)/*** Djauhariya, E.; Rosman, R. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Perkembangan Teknologi Tanaman Rempah dan Obat* (Indonesia) ISSN 1829-6289 (2008) v. 20(2) p. 75-90, 1 table; 19 ref.

PIPER RETROFRACTUM; CROPPING SYSTEMS; PRODUCTIVITY; CONTROL METHODS.

Java long pepper (*Piper retrofractum* Vahl.) is one of medicinal crops used for traditional medicine. Nowadays, traditional medicinal industries have developed, and the pepper has also increased. However, the average productivity of java long pepper is very low, 1.48 t/ha/yr, while its potential productivity is around 2.5 t/ha/yr. This low productivity is due to the GAP (good agricultural practice) and QSE (quality, safety and efficacy) have not been applied by farmers. For that reason, research on cultivation technology of java long pepper and developing cultivation technology package of java long pepper are needed to support the application of GAP and QSE and to support the development of java long pepper industry.

171 PUSPITASARI, W.

Effects of indole butyric acid on the growth media of mutant line of *Chrysanthemum morifolium* cv. Red Stroika. *Pengaruh penambahan IBA (indole butyric acid) dalam media pertumbuhan planlet galur mutan krisan (Chrysanthemum morifolium cv. Red Stroika)*/ Puspitasari, W.; Yulidar; Dwimahyani, I. (Pusat Aplikasi Teknologi Isotop dan Radiasi, Jakarta (Indonesia)). [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 195-198, 6 ill., 1 table; 10 ref. 621.039.8/SIM/p

DENDRANTHEMA MORIFOLIUM; MUTANTS; IN VITRO REGENERATION; IBA; VITROPLANTS; PLANT GROWTH SUBSTANCES; GROWTH RATE; ROOTS.

Chrysanthemum is one of famous ornamental plants that has been using in a lot of ceremonies. In order to obtain a sufficient planting material, in vitro propagation had been performed. Rooted shoots derived from in vitro cultured adapted better than the unrooted, when transplanted into the field (acclimatization). Therefore, in this research root induction of mutant line of *Chrysanthemum morifolium* cv. Red Stroika *in vitro* shoots were conducted by applying indole butyric acid (IBA). The treatment tested was an application of synthetic auxin (IBA) into Murashige Skoog (MS) medium in 2 different level of concentrations (2.5; 5 mg/l) and control (without IBA). The observed parameters were shoot height, number of leaf, time of root initiation, length of root and root characteristic. The observations were conducted until 6 weeks after subcultured. The results showed that medium containing 2.5 mg/l IBA had better characteristics compared to other treatments with rounded form, relatively short root initiation time (9.57 days), large amount of leaves, higher shoot, and longer root (11.33 cm).

172 SUMARMATA, E.

Organic based of controlled aerobic rice intensification technology to double rice production and to accelerate the sustainability of food security. *Teknologi intensifikasi padi aerob terkendali berbasis organik (IPT-BO) untuk melipatgandakan produksi padi dan mempercepat kemandirian dan ketahanan pangan*/ Sumarmata, T.; Yuwariah, Y. (Universitas padjadjaran Bandung (Indonesia). Fakultas Pertanian). [Proceedings of the seminar on rice research results appreciation supporting national rice production increase. Book 1]. Prosiding seminar apresiasi hasil penelitian padi menunjang P2BN: peningkatan produksi beras nasional. Buku 1., Sukamandi (Indonesia), 19-20 Nov. 2007. Buku 1/ Suprihatno, B.; Daradjat, A.A.; Suharto, H.; Toha, H.M.; Setiyono, A.; Suprihanto; Yahya, A.S. (eds.) Sukamandi (Indonesia): BB Padi, 2008: p. 127-145, 22 ref. 633.18.001.57/SEM/p bk1

ORYZA SATIVA; INTENSIFICATION; TECHNOLOGY; CULTIVATION; ANAEROBIC TREATMENT; ORGANIC FERTILIZERS; PRODUCTION INCREASE; SUSTAINABILITY; FOOD SECURITY.

Intensification of permanent flooding (anaerobic) of paddy soils not only reduces of soil biological power significantly, but also restricts the roots growth. Biodiversity will be limited under anaerobic condition. Soil organisms can not grow optimally and estimated only about 25% rice roots can grow normally. In order to sustain the food security, rice productivity must be increased from 4-6 t/ha to 6-8 t/ha, while to become a rice exporter, the rice production should be increased to 8-12 t/ha. The result of various field studies indicated

most of paddy soils in production centre has low organic content (<2%) and based on soil health indicator, it can be categorized as sick soils. Under these conditions, the increase of inorganic fertilizers dosage application may give a nonsignificant effect on rice production. There is an indication that the rice production receiving high inorganic fertilizers dosage has reached a levelling off and caused the decreasing of soil quality and soil health. To increase the rice production and revitalize the soil quality and soils health; it can be reached by using the soil biological power in organic based of controlled aerobic rice intensification technology (OB-CARl). This technology is a holistic rice production system by using and integrating the soil biological power, plant, fertilizers and water management according to the plan and design (by design). The results of field research of organic based of controlled aerobic rice intensification technology using several rice varieties in the Province of West Java, Central Java and East Java revealed that the rice was able to produce grain yield about 12-16 t/ha (average of an increasing about 50-150% compared to anaerobic rice cultivation). This high rice yield is highly correlated with the increasing of roots zone about 4-10 times, number of productive tillers about 60-80 tillers, length of panicles and number of grain/panicle, and as well as the increase of soil biodiversity (beneficial organisms) under aerobic condition.

173 TOHA, H.M.

[Developing upland rice supporting national rice production increase]. ***Pengembangan padi gogo menunjang program P2BN***/ Toha, H.M. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). [Proceedings of the seminar on rice research results appreciation supporting national rice production increase. Book 1]. Prosiding seminar apresiasi hasil penelitian padi menunjang P2BN (peningkatan produksi beras nasional). Sukamandi (Indonesia), 19-20 Nov 2007. Buku 1/ Suprihatno, B.; Daradjat, A.A.; Suharto, H.; Toha, H.M.; Setiyono, A.; Suprihanto; Yahya, A.S. (eds.) Sukamandi (Indonesia): BB Padi, 2008: p. 295-323, 4 ill., 14 tables; 45 ref 633.18.001.57/SEM/p bk1

ORYZA SATIVA; VARIETIES; INTERCROPPING; PRODUCTION INCREASE; INTEGRATED PLANT PRODUCTION; PRODUCTIVITY; DRY FARMING; ECONOMIC ANALYSIS.

The plenge to fulfill national rice needs onwards is getting precarious, mainly because of fertile irrigated rice field conversion into non agriculture interest; its productivity level is descending and the increasing of human population who needs rice. There are two efforts to overcome this problem, i.e. developing new rice field (exposure) and increasing the productivity of existing rice field. But these endeavors steered because of irrigation limitation and expensive cost of new rice field (exposure). Increasing the productivity of existing rice field is also difficult as much Indonesia's productivity level is approaching tropical upper limit. Another potential alternative is development of rainfed land, tidal, swamp land, dry land for upland rice. The total area of Indonesia upland rice harvested is about 1.1-1.2 million ha (10% of national rice harvest) with 2.88 million ton production (5% of national production), 2.58 t//ha productivity level (53% of regular rice's productivity level which has achieved 4.75 t/ha). Potential dry land suitable for one season plantation reaches 25.1 million ha and which is suitable for upland rice land more than 5.0 million ha. There are three potential of upland rice development sub-ecosystems, i.e. plain land including river's land, watershed hilly land, and as plantation and commercial forest intercropping plant. Meanwhile, from its productivity level, upland rice has achieved 7.2 t/ha once, in Indonesia research scale has achieved 6.5 t/ha, as IFP intercropping plant has achieved 5.0 t/ha, and as plantation intercropping plant has achieved 4.0 t/ha. Upland rice production in one unit upland rice based on monoculture system has achieved 3.5 t/ha. In a large scale upland rice

ICM model within three years in Lampung resulted more than 5.0 t/ha. If there is escalation 1.0 ton/ha into 3.5 t/ha from 1.2 million ha traditional land, 3.0 t/ha in IFP intercropping plantation (there is 2 million ha potential land) and 0.2 million ha new rice field exposure with 3.0 t/ha productivity, then totally there will be 7.8 million ton per year national rice production embankment. This opportunity is significant for national scale. Development approach for three sub-ecosystems is preferable refer to ICM approach model and applying composite variety or mosaic variety to reduce blast disease spread.

174 YUSRON, M.

Support of cultivation technology on development of king of bitter (*Andrographis paniculata* Nees). *Dukungan teknologi budidaya untuk pengembangan sambiloto (Andrographis paniculata Nees)*/ Yusron, M. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Perkembangan Teknologi Tanaman Rempah dan Obat* (Indonesia) ISSN 1829-6289 (2008) v. 20(2) p. 63-74, 1 table; 28 ref.

DRUG PLANTS; CULTIVATION; FERTILIZATION; CROPPING SYSTEMS; PEST CONTROL; DISEASE CONTROL; POSTHARVEST TECHNOLOGY.

Andrographis paniculata is one of the herbal medicinal plants which mostly used by traditional medicinal industry. Agency for Drug and Food Control has put this plant as one of the priorities in the development of phytopharmaceutical drugs. Therefore standardized dried and extract raw materials must be produced through the application of good agricultural practices, including high yield plant material, crop management and postharvest processing. Development program of king of bitter should be supported by policies, such as identification of andrographis growing area, introducing intercropping system, and providing commercial scale extraction technology. Development of king of bitter includes local industrial sector and farmers.

F02 PLANT PROPAGATION

175 BUDIYANTI, T.

[Response of various IAA and BAP concentration for in vitro multiplication of papaya (*Carica papaya* L.) shoot]. *Tanggapan beberapa konsentrasi IAA dan BAP pada multiplikasi tunas pepaya (Carica papaya L.) secara in vitro*/ Budiyanti, T. (Balai Penelitian Tanaman Buah Tropika, Solok (Indonesia)). [Proceedings of national seminar of technology innovation and agricultural institution in effort to improve community empowerment. Book 1]. Prosiding seminar nasional inovasi teknologi dan kelembagaan pertanian dalam upaya peningkatan pemberdayaan masyarakat. Yogyakarta (Indonesia), 24-25 Aug 2007. Buku 1/ Wardhani, N.K.; Mudjisihono, R.; Mashudi, M.F.; Jamal, E.; Wirianata, H.; Suroso; Hartati, R.M.; Hermantoro; Sayekti, A.S. (eds.) Yogyakarta (Indonesia): BPTP Yogyakarta dan BBP2TP, 2007: p. 41-45, 2 ill., 2 tables; 11 ref. 631.152/SEM/p bk1

CARICA PAPAYA; SHOOTS; IN VITRO; IAA; IBA; PLANT GROWTH SUBSTANCES.

This experiment was conducted at Tissue Culture Laboratory of Indonesian Tropical Fruits Research Institute from October 2006 until May 2007, and aimed at finding out suitable growth regulator BAP and IAA concentration for shoot multiplication on in vitro propagation of papaya. The BAP concentration used were 0.2, 0.4 and 0.6 ppm, the IAA concentration used were 0, 2, 4 ppm. The results showed that shoot multiplication of papaya

tissue culture was affected by IAA and BAP concentrations. The best shoot multiplication was obtained from MS medium with 0.2 ppm BAP without IAA. The shoot multiplication in medium MS with IAA 2 ppm, 4 ppm and BAP produced callus formation and small shoots.

176 KASI, P.D.

Development of embryogenic callus of sago (*Metroxylon sago* Rottb.) on three systems of in vitro culture. *Perkembangan kalus embriogenik sagu (Metroxylon sago Rottb.) pada tiga sistem kultur in vitro*/ Kasi, P.D.; Sumaryono (Balai Penelitian Bioteknologi Perkebunan, Bogor (Indonesia)). *Menara Perkebunan* (Indonesia) ISSN 0215-9318 (2008) v. 76(1) p. 1-10, 4 ill., 1 table; 18 ref.

METROXYLON; CULTURE TECHNIQUES; IN VITRO CULTURE; EMBRYO; CALLUS; PLANT PROPAGATION

Embryogenic callus of sago (*Metroxylon sago* Rottb.) has been grown on three systems of in vitro culture, i.e. agar-solidified medium, liquid medium, and temporary immersion system (TIS) medium to observe and compare the development of embryogenic callus over one passage of six weeks. A-half gram of embryogenic callus was cultured on a modified MS medium containing 10 mg/l 2,4-D and 0.1 mg/l kinetin. For histological studies, embryogenic callus was fixed in FAA and embedded in paraplast wax. Serial sections were stained with safranin 1% and observed microscopically. The end of culture period, the development of embryogenic callus in TIS medium was relatively better than other media. Fresh weight of callus in liquid medium and TIS increased by 6.5 times, while on agar-solidified medium increased by 5.4 times in six weeks. About 40% of callus in liquid medium and TIS and 20% of callus on agar solidified medium have changed into somatic embryos at globular stage. Histology structure of embryogenic callus of the three systems of in vitro culture shows different pattern. On agar-solidified medium, secondary callus and friable embryogenic callus consisting of meristematic cells were formed. In contrast, more embryogenic cells were formed in liquid medium and TIS to support maturation process on somatic embryos. Therefore, temporary immersion system and liquid medium are recommended for maturation of embryogenic callus, whereas agar-solidified medium is for proliferation of embryogenic callus of sago.

F03 SEED PRODUCTION AND PROCESSING

177 RUSTIJARNO, S.

Support of rice seed institution for food security at Prima Tani location in Kulon Progo District [Indonesia]. *Kelembagaan perbenihan padi mendukung ketahanan pangan di lokasi Prima Tani Kabupaten Kulon Progo/* Rustijarno, S.; Wardhani, N.K. (Balai Pengkajian Teknologi Pertanian Yogyakarta (Indonesia)). [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.). Sukamandi: BB Padi, 2009: p.1619-1629, 1 ill., 4 tables; 8 ref. 633.18-115.2/SEM/i bk4

RICE; SEED INDUSTRY; INNOVATION; BREEDERS SEED; SEED CERTIFICATION; PRODUCTION POSSIBILITIES; FARMERS ASSOCIATIONS; TECHNOLOGY TRANSFER; FOOD SECURITY; JAVA.

Food is the main people's need, so rice productivity enhancement through agricultural technology innovation is needed to guarantee the food supplies. The improved rice varieties transplanted in Yogyakarta Province showed that about 70% was dominated by IR-64. Planting one variety in the same area for a long time is not recommended. This practice can cause lower plant productivity because of lower resistance of the plant to pest and disease due to genetically quality degradation which is caused by the cross breeding with other variety with low productivity potential. The reduction of IR-64 variety proportion with other varieties has to be planned to increase rice productivity and also to maintain plant resistance to certain pest and disease. The problems found are limited seed stock of other varieties on the market, the limitation of farmer's skills to adopt the ready technology innovation, and the weakness of farming institution performance. To overcome those constraints, in the year of 2007 at Kulon Progo, Prima Tani programme was conducted by doing technology innovation and institutioning. The study was held in Banaran Village, Galur, Kulon Progo District on 1st semester in the year 2007-2008 by Cimelati rice breeding technology innovation and seeding institution shaping. The study result showed that field area in the range of 280-2800 m^2 with 33 personnels of farmer's coordinator, field area of 3 hectares, the potential Cimelati rice productivity of 5.66-6.92 t/ha was higher compared with IR-64 which was 5.04 t/ha, harvest result was demanding by the market, marketing network was established with rice seed breeder group and received seed distributor certificate from "Gapoktan" (Farmers Group Union). The effect that farmer was giving positive response and the programme continuity in the form of rice seeding institution empowerment can be done by increasing farmer's resources capacity, partner cooperation and open a wide information and market access.

F04 FERTILIZING

178 GANI, A.

[Advantages of slow release NPK compound fertilizer in lowland rice]. ***Keunggulan pupuk majemuk NPK lambat urai untuk tanaman padi sawah***/ Gani, A. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia) ISSN 0216-9959 (2009) v. 28(3) p. 148-157, 3 ill., 8 tables; 20 ref.

IRRIGATED RICE; NPK FERTILIZERS; FERTILIZER APPLICATION; AGRONOMIC CHARACTERS; YIELD COMPONENTS.

Inefficiency of N fertilizer used in lowland rice is mainly due to volatilization and leaching. Using zeolites to develop slow released N fertilizers could prevent nutrient losses. Experiment on the response of lowland rice to slow released compound fertilizers (SRF NPK) and a usual compound fertilizer, was conducted in the Sukamandi Experimental Farm during dry season of 2008 using a randomized complete block design with four replications. Treatments consisted of four levels of compound fertilizer, control treatment (without fertilizer) and conventional NPK for comparison. Results of the experiment showed that SRF NPK in the same dosage of N gave better growth on yield components and grain yield. All dosages of SRF NPK maintained chlorophyll reading above the critical limit, compound fertilizers gave SPAD values comparable to conventional NPK. Grain yields at 200-400 kg/ha compound fertilizers were not significantly different with conventional NPK. At rate of 126 kg N/ha grain yield was higher with compound fertilizers, especially with SRF NPK. Application of 300 kg/ha SRF NPK + 100 kg urea yielded higher than that of conventional NPK, which mean to save 20 kg N, 10 kg P2O5 and 30 kg K2O per ha. SRF NPK had greater N used efficiency than that of conventional NPK which solely used urea as N source. At 126 kg N and 40 kg P2O5 per ha conventional NPK, SRF NPK, and usual NPK had N

use efficiencies of 21 kg, 25 kg, and 22 kg grain/kg N, respectively. Using slow released compound fertilizer (SRF NPK) is a good alternative for solving problem of N single nutrient fertilizer scarcity. SRF NPK application also increase the N use efficiency, hence, reduces the N fertilizer.

179 MULYADI

[Application of sludge from paper mill wastes on rice cultivation related to Zn metal substance on agricultural land]. ***Pemberian sludge dari limbah pabrik kertas untuk budidaya padi kaitannya dengan logam Zn pada lahan pertanian***/ Mulyadi; Anshori, A.; Artanti, R. (Balai Penelitian Lingkungan Pertanian, Jakenan (Indonesia)). [Proceedings of national seminar of technology innovation and agricultural institution in effort to improve community empowerment. Book 1]. Prosiding seminar nasional inovasi teknologi dan kelembagaan pertanian dalam upaya peningkatan pemberdayaan masyarakat. Yogyakarta (Indonesia), 24-25 Aug 2007. Buku 1/ Wardhani, N.K.; Mudjisihono, R.; Mashudi, M.F.; Jamal, E.; Wirianata, H.; Suroso; Hartati, R.M.; Hermantoro; Sayekti, A.S. (eds.) Yogyakarta (Indonesia): BPTP Yogyakarta dan BBP2TP, 2007: p. 247-253, 9 tables; 9 ref. 631.152/SEM/p bk1

ORYZA SATIVA; SEWAGE SLUDGE; ZINC; PULP AND PAPER INDUSTRY; LIQUID WASTES; GROWTH; YIELDS; SOIL CHEMICOPHYSICAL PROPERTIES.

Pulp and paper mill industry gives considerable contribution in exporting nonfuel and gases products, and particularly on labour recruitment; but on the other side, mill industry also contributes at damaging area. This is caused by production process, which that every industry applies main and secondary raw materials with chemistry matters, and then its wastes may estimated containing the same elements. Efforts to reduce wastes volume have been done through recycling by doing recovery material and second hand energy to be used as returning inputs in the next process. Besides, the effluent was also produced. The sludge could be used as soil amandment to increase organic matter content and soil fertility. Field research was done in Jakenan Experimental Station and used completely randomized block design, with 7 treatments. The treatments of sludge wastes utilization were: (a) without sludge, (b) 2.5 ton/ha, (c) 5 ton/ha, (d) 7.5 ton/ha, (e) 10 ton/ha, (f) 12.5 ton/ha, and (g) 15 ton/ha. Every treatment replicated three trials with the subplot size was 5 m x 4 m. Result of research showed that sludge wastes could increase soil cation exchange capacity with average value of 5.21 to 9 me/100 g. Besides, there was useful macro and micro nutrient for crops. Zinc substance content in soil and crop was still under specified level. Application of sludge 2.5-7.5 ton/ha could increase rice yield between 0.10 to 0.18 ton/ha, but by increasing sludge application up to 10-15 ton/ha resulted in rice yield decrease around 0.24 to 0.50 ton/ha compared to the control.

180 MUSFAL

Efficiency of using NPK fertilizer through the application of vesicular arbuscular mycorhizae (VAM) for maize. ***Efisiensi penggunaan pupuk NPK melalui pemanfaatan cendawan mikoriza arbuskular pada jagung/*** Musfal (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)); Delvian; Jamil, A. *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2009) v. 28(3) p. 165-169, 4 ill., 5 tables; 12 ref.

ZEA MAYS; NPK FERTILIZERS; VESICULAR ARBUSCULAR MYCORRHIZAE; EFFICIENCY; ABSORPTION; YIELDS.

Effort for increasing maize yield and efficiency of NPK fertilizer was studied by applying VAM. The experiment was conducted from October 2007 till February 2008, at the green house in the Pasar Miring Experimental Farm, using a complete randomized design. The first factor was the application of VAM (0, 5, 10, 15 and 20 g/pot) and the second factor was the five rates of fertilizers based on "PHSL" maize in Tiga Binanga (0%, 25%, 50%, 75% and 100% of the recommended dosages). N nutrient was found as the main limitating factor for the optimum yield of maize in Tiga Binanga. The application of VAM, following the application of NPK fertilizer of the lower dosage resulted in the higher level of agronomic efficiency. The highest yield was obtained from the application of 20 g VAM/pot and 100% of fertilizer rate but application of 75% rate of fertilizer and 5 g VAM/pot produced as much yield as that of 100% fertilizer rate.

181 NUGRAHA, S.

Effect of fertilizer application to rice quality and rice milling recovery. ***Pengaruh aplikasi pola pemupukan terhadap kualitas beras dan rendemen beras giling/*** Nugraha, S.; Adiandri, R.S. (Balai Besar Pascapanen Pertanian, Bogor (Indonesia)); Sardjana. [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.). Sukamandi: BB Padi, 2009: p.1497-1504, 3 tables; 11 ref. 633.18-115.2/SEM/i bk4

ORYZA SATIVA; FERTILIZER APPLICATION; APPLICATION RATES; DOSAGE; NUTRIENT AVAILABILITY; YIELD COMPONENTS; QUALITY; MILLING.

The rice production is highly correlated with the pattern and rate of fertilizers. The needs and the efficiency of the fertilizers are determined by the four intercorrelated factors, i.e. soil nutrient availability, soil nutrient required by the plant, targeted production and expected quality of the product. An experiment was conducted during the wet season of 2007/2008, in Kluwan Village, Penawangan Subdistrict, Grobogan, Central Java. The objective of this research was to study the influence of fertilizing pattern to rice production, rice quality, and milling recovery. The experiment was done through an omission plot approach, arranged in randomized block design with three replications. Treatments were farmer fertilizing practice, NK fertilizing, PK fertilizing, and NPK fertilizing. The data were analyzed by using a SPSS.l0 program and the different among treatment were assessed by the Duncan's multiple range test at 5% significance level. Research results indicated that fertilizing pattern affected differently to paddy production, the 1.000 grain weight, and brown rice recovery, but did not significantly affect the rice yield quality. The highest recovery (65.32%) was achieved by the NK fertilizing pattern. The highest of the 1.000 grain weight (30.14 g) occurred at NK fertilizing pattern. The highest broken rice (38.41%) resulted from the PK fertilizing pattern treatment and the highest brown rice recovery (77.41%) was obtained from NK fertilizing pattern treatment.

182 PRIBADI, E.R.

Efficiency of NPK fertilizer application on java turmeric (*Curcuma xanthorrhiza* Roxb). ***Efisiensi pemupukan NPK pada temulawak (Curcuma xanthorrhiza Roxb)/*** Pribadi, E.R.; Rahardjo, M. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2008) v. 14(4) p. 162-170, 6 ill., 6 tables; 24 ref.

CURCUMA XANTHORRHIZA; FERTILIZER APPLICATION; DOSAGE; PRODUCTION; COST ANALYSIS; EFFICIENCY.

Efficiency of inorganic fertilizers application is determined by effective type and fertilizers dosage. Current experiment was designed to compare the efficiency of application of three levels dosage of urea, SP-36, and KCl on java turmeric farming system. The experiment was conducted at Sukamulya (Sukabumi) Experimental Garden on Latosol soil type, 350 m above sea level, with climate type A of Schmidt and Ferguson's climate classification from August 2007 to September 2008. Treatments were combination of 100 kg/ha, 200 kg/ha, and 300 kg/ha of each urea, SP36, and KCl fertilizer. The treatments were arranged in factorial randomized block design with three replications. Organic fertilizer (manure) was applied to all experiment plots at planting time with dosage of 20 tons/ha. SP36 and KCl fertilizers were applied at planting time, while urea fertilizer was applied in three equal parts, separately, on planting time, one and two months after planting time. Java turmeric promising line of F was used as plant materials and planted at 75 cm x 50 cm plant spacing. Physical and economic efficiency analysis of the each treatment unit was used to evaluate the efficiency of fertilizer application with treatment-related costs were assumed as variable costs. Results showed that based on physical and economic efficiency, fertilizer combination of 200 kg urea/ha, 100 kg SP36/ha, and 100 kg KCl/ha was the most efficient dosage with yield of rhizome, curcuminoid and anthorhizol at the dosage level per 1000 m^3 were 2,277 kg, 33.24 kg, and 73.26 kg respectively. Moreover, crop value was Rp 344.500/1.000 m^2, operating expense ratio 23.13%, net farm income from operation ratio 76.87%, and economic efficiency of each treatment compare to control 5.08 times.

183 WIDIASTOETY, D.

Effect of KNO_3 and $(NH_4)_2SO_4$ on the growth of Vanda seedling. ***Pengaruh KNO_3 dan $(NH_4)_2SO_4$ terhadap pertumbuhan bibit anggrek Vanda/*** Widiastoety, D. (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2008) v. 18(3) p. 307-311, 4 tables; 20 ref.

VANDA; NITROGEN FERTILIZERS; COMPOUND FERTILIZERS; SEEDLINGS; GROWTH.

The objective of the research was to determine the nitrogen sources from KNO3 and (NH4)2SO4 on the growth of Vanda seedlings. N nutrient is needed for vegetative growth. The experiment was conducted in the Greenhouse of Indonesian Ornamental Crops Research Institute at Pasarminggu, from November 2006 to May 2007. Vanda seedlings used in the experiment were 3 cm of height with initially had 5 leaves. The seedlings were grown on the media of charcoal and coconut husk mixture. The experiment was arranged in a randomized block design with 7 treatments and 4 replications. The treatments were control, 0.4%, 0.5%, 0.6% KNO3; and 0.4%, 0.5%, 0.6% $(NH_4)_2SO_4$. The results showed that 0.5% KNO_3 indicated the best growth of leaf length, leaf width, leaf area, leaf number, and root number compared to other treatments. The use of KNO_3 as nitrogen source was better than $(NH_4)_2SO_4$ on the growth of Vanda seedlings.

F08 CROPPING PATTERNS AND SYSTEMS

184 SUSILA, W.R.

Integrated model of sugarcane planting and harvesting schedule: a compromised approach. ***Model keterpaduan jadwal tanam dan tebang tebu: pendekatan kompromi/***

Susila, W.R. (Lembaga Riset Perkebunan Indonesia, Bogor (Indonesia)). *Informatika Pertanian* (Indonesia) ISSN 0852-1743 (2007) v. 16(1) p. 937-957, 8 tables; 12 ref.

SUGARCANE; PLANTING; HARVESTING; INTEGRATED PLANT PRODUCTION; JAVA.

One of the main problems causing a setback of Indonesian sugar industry is inefficiency in farm level because of lack of integrated production system. This study was aimed to develop a model of integrated production systems between farm and sugar plant activities through an integrated planting and harvesting schedule. The approach used a compromise approach of multi party multi objective (MPMO) models. The results showed that productivity in farm and sugar plant can be improved by developing an integrated production system through an integrated planting and harvesting schedule. With supervisions and model modification, the MPMO model can be applied, especially for sugar plantation in Java.

F30 PLANT GENETICS AND BREEDING

185 ARIEF, R.W.

Organoleptic test of some hybrid rice varieties and new high yielding rice varieties. ***Uji organoleptik nasi beberapa varietas padi hibrida dan padi varietas unggul baru/*** Arief, R.W.; Ernawati, R.; Irawati, A. (Balai Pengkajian Teknologi Pertanian, Lampung (Indonesia)). [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.). Sukamandi: BB Padi, 2009: p.1473-1480, 1 ill., 3 tables; 8 ref. 633.18-115.2/SEM/i bk4

RICE; HYBRIDS; HIGH YIELDING VARIETIES; ORGANOLEPTIC PROPERTIES; CONSUMER BEHAVIOUR.

Several hybrid rice and new high yielding varieties have been released by the government. An observation was conducted at AIAT Lampung in September 2007, to evaluate the organoleptic of 3 hybrid rice, i.e Bernas Prima, Intani 2, and PP1 and 4 new HYV's, i.e Batang Piaman, Cigeulis, Mekongga, and Ciherang. The variables observed were color, flavor, taste, and texture. Data were statistically analyzed and continued with LSD test at 5% level. The result showed that Intani 2 and Bernas Prima were more preferred as compared to the others.

186 ARWIN

Performance of rice low phytic acid mutant lines in M4 generation from irradiation of Diah Suci variety. ***Penampilan galur mutan padi rendah asam fitat pada generasi M4 dari iradiasi varietas Diah Suci***/ Arwin; Dewi, A.K.; Yulidar; Puspitasari, W. (Pusat Aplikasi Teknologi Isotop dan Radiasi, Jakarta (Indonesia)). [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 161-164, 1 ill., 2 tables; 7 ref. 621.039.8/SIM/p

IRRIGATED RICE; VARIETIES; MUTANTS; PHYTIC ACID; GAMMA IRRADIATION; AGRONOMIC CHARACTERS; PHENOTYPES; CROP PERFORMANCE.

The research on low phytic acid content in rice had been done from irradiated Diah Suci variety. Phytic acid as antinutrition, if high content in food is consumed, causes difficulties of essential minerals adsorption by body. The material used was Diah Suci variety irradiated by 0.2 KGy gamma rays. Selection for phytic acid content was done in laboratory on M2 plants (M3 seeds) with Chen's and Torribara reagent. In M4 generation purification and description of agronomy characters for mutant lines was done for homogenous low phytic acid content or phenotype characters in the field. Phenotypes characters in the field were plant height, total branch and panicle length. Observation results on phenotype characters in the field showed that plant were homogenous and the others were segregation. Results of phytic acid content analysis in the laboratory showed homogenous in 4th standard.

187 DEWI, I.S.

[Characterization of doubled-haploid lines from rice anther culture]. ***Karakterisasi galur haploid ganda hasil kultur antera padi/*** Dewi, I.S. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)); Trilaksana, A.C.; Koesoemaningtyas, T.; Purwoko, B.S. *Buletin Plasma Nutfah* (Indonesia) ISSN 1410-4377 (2009) v. 15(1) p. 1-12, 2 ill., 10 tables; 26 ref.

ORYZA SATIVA; PROGENY; HAPLOIDY; ANTHER CULTURE; RECIPROCAL CROSSING; PLANT ANATOMY; AGRONOMIC CHARACTERS.

New genetic variation in rice can be obtained by crossing between subspecies of rice (Indica, Japonica, and Javanica). Variability is a must in breeding materials. The objectives of this research were to evaluate morphological and agronomical characters of doubled-haploid lines derived from anther culture of F1 and to determine maternal effect from reciprocal crosses. The materials used in the experiment were 144 haploid lines derived from anther culture of F1 obtained from reciprocal crossing between Asemandi/Taipei 309 and Taipei 309/Asemandi. Asemandi belongs to *O. sativa* subspecies Javanica, whilst Taipei 309 is subspecies Japonica. Evaluation on morphological and agronomical characters was based on Standard Evaluation System for Rice from IRRI. The results indicated that agronomical characters between haploid lines were varied, but individuals in lines were similar as shown by all morphological and agronomical characters. New characters were also found in leaf and stem angle, awn existence, awn length, awn color, panicle type and exertion, axis type, secondary branch of panicle, and grain type. Maternal effect could be seen only in booting stage, number of sterile tillers and percentage of fertile tillers. Based on number of fertile tillers, number of fertile spikelets, fertility, weight of 100 grains and yield/plant, A/T 12, A/T 57, A/T 200, A/T 274, A/T 282, A/T 321, A/T 333, A/T 8, A/T 399, /T 75a, and T/A 258 were potential lines to be further selected.

188 DJATIHARTI, A.

Adoption of new high yielding varieties and the preferences of the agronomic traits of lowland rice by the farmers in Ogan Komering Ulu Timur and Ogan Komering Ilir Districts [Indonesia]. ***Adopsi varietas unggul dan preferensi sifat-sifat agronomis tanaman padi sawah di tingkat petani Kabupaten Ogan Komering Ulu Timur dan Ogan Komering Ilir/*** Djatiharti, A.; Ruskandar, A. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi

teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.). Sukamandi: BB Padi, 2009: p. 1331-1338, 4 tables; 6 ref. 633.18-115.2/SEM/i bk4

IRRIGATED RICE; HIGH YIELDING VARIETIES; INNOVATION ADOPTION; AGRONOMIC CHARACTERS; FARMERS; CONSUMER BEHAVIOUR; ORGANOLEPTIC PROPERTIES; SUMATRA.

The purpose of the survey was to evaluate the adoption of the new high yielding varieties and preferences of the agronomic traits of lowland rice by the farmers. The survey was conducted at the rice production center in South Sumatra Province in 2007. The results of the study showed that the new high yielding varieties which were dominantly adopted by the farmers in South Sumatra Province were Ciherang (86.11%), IR42 (8.33%), and Ciliwung (5.56%), followed by Widas, Cimelati, Cigeulis, Batang gadis, Cibogo, Gilirang, and Bondoyudo. The agronomic characters of rice preferred by the farmers were long grain (80.56%), plant height of about 1 m (86.11%), lot of grain number (100%), easy to harvest (53.57%), and good taste (100%).

189 KRISNAWATI, A.

Yield stability of promising soybean lines. ***Stabilitas dan hasil beberapa galur harapan kedelai/*** Krisnawati, A. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)); Adie, M.M. *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia) ISSN 0216-9959 (2009) v. 28(3) p. 170-175, 1 ill., 4 tables; 27 ref.

GLYCINE MAX; GENOTYPES; HIGH YIELDING VARIETIES; YIELDS.

In Indonesia, soybean is cultivated in diverse environments, so that varieties having high yield potential in various environments need to be developed. The aim of the experiment was to determine the stability and adaptability of ten soybean lines in twelve locations. Ten soybean lines from ILETRI and two check varieties (Burangrang and Anjasmoro) were tested in 12 locations in 2008. Each trial was arranged in randomized block design with four replicates. Plot size was 2.8 m x 4.5 m and plant spacing was 40 cm x 15 cm, two plants/hill. The statistical method to measure the stability and adaptability was the AMMI analysis. The yield of 12 soybean genotypes ranged from 1.94 to 2.39 t/ha, with average yield of 2.11 t/ha. The check variety Burangrang (2.22 t/ha) had higher yield than Anjasmoro (2.17 t/ha). The highest yield was obtained by Aochi/W.C.6.62 (2.39 t/ha). Combine analysis showed that the main principle component (location and lines) and their interaction were significant for yield, suggesting that certain lines adapted well in a particular environment, but not in other environments. The AMMI analysis showed that line Shr.W.60/lAC.100-39-5-48-19 was a stable genotype with wide adaptation. The other genotypes were unstable or not adapted to a specific location. Line Shr.W.60/IAC.100 39-5-48-19 had a higher yield than the check variety Anjasmoro, and had similar yield to Burangrang. Line Aochi/W.C.6.62 which have the highest yield was adapted to a specific location. Line Shr.W.60/IAC.100-39-5-48-19 could be released as a new superior soybean variety.

190 LESTARI, E.G.

Induced mutation and in vitro selection for tolerance to the blight disease (*Fusarium oxysporum f.sp. cubense*) in pisang raja bulu (*Musa paradisiaca* sp.). ***Mutasi induksi dan seleksi in vitro pisang raja bulu (Musa paradisiaca sp.) untuk ketahanan terhadap***

***penyakit layu (Fusarium oxysporum f.sp. cubense)*/** Lestari, E.G.; Purnamaningsih, R.; Mariska, I.; Hutami, S.; Kosmiatin, M.; Roostika, I. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)). [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R.(eds.). Jakarta (Indonesia): PATIR, 2008: p. 137-143, 2 ill., 6 tables; 14 ref. 621.039.8/SIM/p

MUSA PARADISIACA; FUSARIUM OXYSPORUM; IN VITRO SELECTION; CALLUS; INDUCED MUTATION; SOMACLONAL VARIATION; GENETIC RESISTANCE; GAMMA IRRADIATION; SHOOTS.

Due to the preferred flavor and the high content of nutrition, *pisang raja bulu* (*Musa paradisiaca* sp.) has a high economic value. However, this plant has low tolerance to the blight disease, *Fusarium oxysporum f.sp.cubense*. This effort to develop this plant is inhibited by the absence of variety tolerant to the disease. Therefore, to overcome the problem, research should be conducted, particularly for increasing genetic diversity through somaclonal variation. The wide range of varieties is required in order to conduct selection for the required qualities. The research on the somaclonal variation was conducted in the Cell and Tissue Laboratory since January 2007 to May 2008 covered callus induction, mutative induction with the gamma radiation and *in vitro* selection. The media applied for callus induction is MS + 2,4-D 1 mg/l and 3 mg/l + NAA 0 and 0,1 mg/l dan 2,4-D 0,5 mg/l + BA 0,5 mg/l + CH 500 mg/l. The applied radiation dosage is 0, 5, 7.5, 10 and 15 Gy. The radiated calli was subsequently planted on the media containing fusaric acid 30 and 45 mg/l, the living calli was then moved to the similar selecting media. The calli resulted from selection was then regenerated at the media containing BA, TDZ, proline and arginine. In addition, kinetin 5 mg/l + IAA 0.2 mg/l was applied. In the greenhouse, the obtained plantlet was subsequently acclimatized. The result showed that the most suitable calli induction media for pisang raja bulu was MS + 2,4-D 5 mg/l + BA 0.5 mg/l + casein hydrolizate 500 mg/l. The radiation of 10 Gy produced somaclone lines capable of proliferating with the fusaric acid selection media 30 and 45 mg/l. The media for shoot growth is MS + kinetin 5 mg/l + IAA 0.2 mg/l. Plantlet resulted from selection was later acclimatized in the greenhouse using the soil and manure with the ratio of 1:1.

191 PURWANINGSIH, H.

Physical quality, chemical properties, and organoleptic test of red rice local varieties from Yogyakarta Special Region Province [Indonesia]. ***Mutu fisik, kimia dan organoleptik padi merah varietas lokal (Cempo Merah, Mandel, dan Segreng) sebagai plasma nutfah padi Provinsi D.I. Yogyakarta/*** Purwaningsih, H.; Kristamtini; Widyayanti, S. (Balai Pengkajian Teknologi Pertanian Yogyakarta (Indonesia)). [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.). Sukamandi: BB Padi, 2009: p.1481-1488, 4 tables; 8 ref. 633.18-115.2/SEM/i bk4

ORYZA SATIVA; LAND VARIETIES; VARIETY TRIALS; GERMPLASM CONSERVATION; YIELD COMPONENTS; CHEMICOPHYSICAL PROPERTIES; ORGANOLEPTIC PROPERTIES; CONSUMER BEHAVIOUR; JAVA.

Quality of rice is influenced by physical factor, chemical content and organoleptic consumer preference so that it is acceptable in the market. Three local rice varieties representing Yogyakarta's red rice germplasm, namely Cempo Merah, Mandel, and Segreng were used in this study. The variables observed for physical quality of rice were head rice, broken rice, brewer rice, chalkiness, and damaged grain; for chemical properties were moisture content, protein, fat, harsh fiber, amylose content, amilopectin, and beta carotene; while for organoleptic were color, flavor, taste, and texture. A completely randomized design with three replications was used in this study, followed by DMRT at 5% level. Results indicated that physical quality of Segreng was better than that of Mandel and Cempo Merah as for head rice which were 85.63%, 82.63%, and 59.84%, respectively; broken rice were 7.41%, 10.59%, and 16.23%, respectively; and for brewer rice were 3.05%, 1.95%, and 20.09%, respectively. The rice of Cempo Merah was under the rice quality classification standard due to higher brewer rice. The beta carotene content of the three varieties was 488.65 microgram/100 g (Segreng), 391.73 microgram/ 100 g (Mandel), and 153.15 microgram/100 g (Cempo Merah). The organoleptic test indicated that the consumer preferred to Cempo Merah red rice variety with average result of 3.1 for its color, 2.9 for flavor, 3.1 for taste, and 3.5 for rice texture.

192 SETYOWATI, M.

[Germplasm clustering of wheat (*Triticum aestivum*) based on the quantitative plant characters]. *Pengelompokan plasma nutfah gandum (Triticum aestivum) berdasarkan karakter kuantitatif tanaman*/ Setyowati, M.; Hanarida, I.; Sutoro (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian Bogor (Indonesia)). *Buletin Plasma Nutfah* (Indonesia) ISSN 1410-4377 (2009) v. 15(1) p. 32-37, 3 ill., 6 tables; 8 ref.

TRITICUM AESTIVUM; GERMPLASM; SAMPLING; AGRONOMIC CHARACTERS; MATURATION; PRECOCITY; HIGH YIELDING VARIETIES.

Clustering of the 65 accessions of wheat has been done based on the quantitative plant characters. The purpose of this study was to identify genetic resources of wheat for breeding programs. Result of the analysis showed that there were 6 clusters. Two of those clusters have early maturity and high yielding potential. Cluster of accessions having early maturity and moderately short plant, 1.000 seeds weight, maximum number of tiller, number of productive tiller, panicle length, exertion length were 12 accessions. While cluster with high potential production, short panicle and moderate quantitative characters consisted of 13 accessions. Therefore, those two clusters could be used as genetic resources for early maturity and high yield potential characters of wheat.

193 SIHONO

Observation of agronomic character and production of sorghum (*Sorghum bicolor* L. Moench) promising mutant lines in field. *Pengamatan sifat agronomi dan produksi galur-galur harapan sorgum (Sorghum bicolor* L. Moench*) di lapangan*/ Sihono; Human, S.; Parno (Pusat Aplikasi Teknologi Isotop dan Radiasi, Jakarta (Indonesia)). [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 175-179, 5 ill., 2 tables; 9 ref. 621.039.8/SIM/p

SORGHUM BICOLOR; PROGENY TESTING; MUTANTS; INDUCED MUTATION; GAMMA IRRADIATION; AGRONOMIC CHARACTERS; YIELDS.

Breeding on sorghum has been conducted for many years. One of the techniques used for this is gamma irradiation to obtain mutant with superior characteristic of growth and its yield to the control plant. Research on mutation induction in sorghum using gamma irradiation has been carried out at Center for the Application Isotopes and Radiation Technology, National Nuclear Energy Agency (PATIR-BATAN). Seven promising lines were obtained. The promising line of sorghum was planted at Citayam Bogor to evaluate its growth and yield. The field trials used 7 promising lines with Durra, UPCA-S1 and Mandau as controls. The results showed that Zh-30, B-75, B-83 and B-100 lines gave significant highest yield (7.53-10.13 ton/ha) than control (6.10-7.50 ton/ha).

194 SOBRIZAL

Improvement of growth duration of KI 432 rice line through induced mutation. ***Perbaikan umur tanaman padi galur KI 432 melalui mutasi induksi/*** Sobrizal (Pusat Aplikasi Teknologi Isotop dan Radiasi, Jakarta (Indonesia)). [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 165-168, 1 ill., 3 tables; 12 ref. 621.039.8/SIM/p

ORYZA SATIVA; PURE LINES; INDUCED MUTATION; MATURATION; PRECOCITY; GAMMA IRRADIATION; AGRONOMIC CHARACTERS; DOSAGE EFFECTS.

A pure line KI 432 was constructed through inter subspecific cross of Japonica var. Koshihikari and Indica var. IR36. This line is very ideal as a lowland rice with yield potential more than 12 ton/ha, but its growth duration is very long, i.e. more than 108 days from sowing to flowering and more than 145 days to harvesting. To reduce its growth duration, 50 grams seeds of KI 432 line were irradiated by 200 Gy of gamma ray. Based on the observation of 487 M2 lines consisted of 20 plants each, 3 lines segregated between the plants flowering at 84-85 days and the plants flowering more than 108 days, and 20 lines segregated between the plants flowering at 89-91 days and the plants flowering more than 108 days. All the early flowering M2 plants were harvested individually, and M3 seeds derived from each early M2 plants were planted as pedigree method, each M3 lines consisted of 80 plants. Out of 24 M3 lines observed only one line, RKI 432-6-1, showed early flowering homozygous with growth duration 21-25 days earlier than that of the original line, KI 432. Based on the performance of RKI 432-6-1 line, it was assumed that the earliness of RKI 432-6-1 was controlled by a single recessive gene as a mutation from KI 432. The other characters of RKI 432-6-1 were similar to its original line, KI 432, therefore, this line was very promising to develop to become a new high yielding rice mutant variety after subjecting to various examinations such as multilocation yield trials, main pest and diseases examinations, and others.

195 SUDJINDRO

Improvement of abaca resistance to Fusarium and its development prospect. ***Perbaikan ketahanan abaka terhadap Fusarium dan prospek pengembangannya/*** Sudjindro (Balai

Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)). *Perspektif* (Indonesia) ISSN 1412-8004 (2008) v. 7(2) p. 80-91, 1 ill., 4 tables; 50 ref.

MUSA TEXTILIS; FUSARIUM OXYSPORUM; BREEDING METHODS; IN VITRO; SELECTION; DISEASE RESISTANCE; AGRICULTURAL DEVELOPMENT.

Genetic improvement of abaca clones through hybridization is relatively difficult due to the narrow genetic variability of this crop. The narrow genetic variability of abaca caused by its propagated vegetatively. Alternatively, genetic improvement of abaca could be conducted by mutation and somaclonal variation inductions through in vitro culture. In vitro selection is necessary to identify mutants or variants with certain superior characters. Mutation of abaca which was conducted using chemical mutagen ethyl methane sulphonate (EMS) followed by in vitro selection has resulted in resistant variants to *Fusarium oxysporum f.sp cubense* (Foc). Cultivation of the abaca variants resistant to Foc will decrease total production cost and increase farmers' profit.

196 SUNGKONO

[Screening of sorghum genotypes resistance on acid dryland]. ***Penapisan ketahanan genotipe sorgum pada lahan kering masam*****/** Sungkono; Trikoesoemaningtyas (Institut Pertanian Bogor (Indonesia)); Human, S. [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 169-174, 6 tables; 26 ref. 621.039.8/SIM/p

SORGHUM BICOLOR; GENETIC RESISTANCE; ACID SOILS; MARGINAL LAND; DRY FARMING; AGRONOMIC CHARACTERS; PRODUCTIVITY.

In the near future, Indonesia will face food and energy crisis due to increasing demand and decreasing availability of the two commodities. Up to now, there is no integrated approach to solve the problem. The utilization of Indonesian vast acid soil areas to increase production of food and energy can be used as an alternative in solving food and energy problem. Sweet sorghum is a crop that can produce food from its grain and also energy (bioethanol) from sugar juice in its stalk. The utilization of sweet sorghum as a source of bioethanol will not disturb food production which is now becoming a major concern. This study is aimed at developing sorghum genotypes which are tolerant to acid soil, which is indicated by high grain yield and bioethanol production under acid soil conditions. The experiment has been conducted using augmented design to evaluate 66 sorghum genotypes in acid soils in Lampung Province. Selection for the tolerant genotypes is conducted using discriminant analysis. The results showed that Kawali, GH-ZB-41-07, YT30-39-07, B-76, ZH30-29-07, B-92, Durra, YT30-40-07, Mandau and Numbu were highly tolerant; while Higari-G, ZH-30-35-07, BR-ZH30-07-07, BR-ZH30-06-07 and ZH30-30-07 were moderately tolerant to acid soils.

197 TRESNIAWATI, C.

[Study of genetic relationship of macadamia germplasm collection in the Manoko Experimental Garden (Indonesia). ***Uji kekerabatan koleksi plasma nutfah makadamia (Macadamia integrifolia Maiden Betche) di Kebun Percobaan Manoko, Lembang, Jawa Barat (Indonesia*****)/** Tresniawati, C.; Randriani, E. (Balai Penelitian Tanaman Rempah dan Aneka Tanaman Industri, Sukabumi (Indonesia)). *Buletin Riset Tanaman Rempah dan Aneka*

Tanaman Industri (Indonesia) ISSN 2085-1685 (2008) v. 1(1) p. 21-28, 1 ill., 5 tables; 13 ref.

MACADAMIA TERNIFOLIA; GERMPLASM; COLLECTIONS; AGRONOMIC CHARACTERS.

Macadamia (*Macadamia integrifolia* Maiden Setche) is one of industrial crops having high economic value. Macadamia is an evergreen tree with edible nut. It is indigenous to Australia. Macadamia are not only used as an ingredient in food industry but also as a natural medicine. It is important to have germplasm collection in plant breeding program. Thirteen accessions have been planted at Manoko Experimental Garden, Lembang, West Java. The objective of this study was to estimate the genetic relationship diversity among 13 macadamia accessions. By applying cluster analysis, a dendogram were constructed to differentiate morphological differences among the accessions. The dendogram shows that the grouping of the accessions at different hierarchical levels, based upon the variation was observed. Results show that at 90% of dissimilarity level, the accession of macadamia can be classified into 4 clusters. The first cluster is MINT 8, MINT 7, dan MINT 2. The second cluster is MINT 5, MINT 6, dan MINT 4, the third cluster only consist of MINT 1. The fourth cluster is MINT 12, MINT 9, MINT 13, MINT 11 dan MINT 3. Generally Cluster I marked by weight of fruit, length of leaf and weight of pericarp which are relatively high than others. Cluster II marked by height of plant, height of branch and length of branch which are relatively low than others. Cluster III marked by diameter of fruit and width of leaf which are relatively low than others. Cluster IV marked by high number of branch.

198 YULIASTI

Mungbean mutant lines adaptation at three different location (Bogor, Jambi and Riau (Indonesia)). ***Daya adaptasi galur mutan kacang hijau yang ditanam di tiga lokasi berbeda (Bogor, Jambi dan Riau)/*** Yuliasti; Supriatna, N. (Pusat Aplikasi Teknologi Isotop dan Radiasi, Jakarta (Indonesia)). [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 181-184, 2 ill., 3 tables; 6 ref. 621.039.8/SIM/p

VIGNA RADIATA RADIATA; MUTANTS; PROGENY TESTING; ADAPTABILITY; GENOTYPE ENVIRONMENT INTERACTION; HIGH YIELDING VARIETIES; GENETIC RESISTANCE; JAVA; SUMATRA.

Eight mungbean mutant lines were tested using multilocation test at three different locations with the objective to evaluate genotype x environment interaction for yield adaptability and stability of yield performance in relation to development and release a new variety. Experiment was conducted at Ciseeng-Bogor, Jambi and Riau, in 2007. The study was arranged in a randomized factorial block design, consisted of one factor (mungbean mutant) with four replications. Mutant lines used were PsJ-30-91, PsJ-31-91, PsJ-6-90, PsJ-19-90, PsJ-21-90, PsJ-BII-17-6, PsJ-B 11-5, and PsJ-BII-15. Two varieties used as a control were gelatik (parent) and perkutut (national line). Results of the experiment indicated that genotype x environment interaction for yield in mungbean were significant. The mutant line of PSJ-31-91 (1.16 ton/ha), PsJ-30-91 (1.14 ton/ha) and PsJ-6-90 (1.04 ton/ha) have wide adaptability in two location (Ciseeng-Bogor and Riau), that may be proposed as candidate of new variety.

F50 PLANT STRUCTURE

199 HADIPOENTYANTI, E.
Variability of *Ocimum* spp. based on morphological characters, yields and herbs quality. *Keragaman selasih (Ocimum spp.) berdasarkan karakter morfologi, produksi dan mutu herba/* Hadipoentyanti, E. ; Wahyuni, S. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (indonesia)). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2008) v. 14(4) p. 141-148, 2 ill., 6 tables; 22 ref.

OCIMUM; PLANT ANATOMY; PRODUCTION; ESSENTIAL OILS; CHEMICOPHYSICAL PROPERTIES; QUALITY.

Several basil species show variation in their morphology, production and essential oils. The research was carried out at Cimanggu Experimental Garden, Bogor to find out the morphologycal characters, yield variability and major chemical constituent of basil. Seven collection numbers such as *O. gratissimum, O basilicum, O. sanctum,* dan *O. minimum* were observed and planted each consisted of 50 plants grown in 40 cm x 30 cm rows. Research parameters assessed were morphological characters, herb yield, oil physico-chemical characters and their major chemical constituent of oil. Results showed that the seven numbers of *Ocimum* spp. varied morphologically in their stem, leaves and flower's color. Herb yield of *Ocimum* spp. ranged from 34 - 83 kg fresh herb/plot of 50 plants (cumulative of 3 times harvest). Within species of basil (*O. basilicum*), variation can be seen clearly from their stem, leaves, flower colour and leaves odours. However, within tree basil (*O. gratissimum*), morphologically, it is difficult to be differenciated, except the leaves odours. Oil physico-chemical character are does not meet EOA standard yet. There are variations in major oil constituent of *Ocimum* spp. The accessions having high eugenol content were purple leaf basil (46%) and tree basil A (37.04 %). The collections with high methyl eugenol were green leaf basil (63.13%), holly basil I (36 %), and bush basil B (68%). High eugenol content (40.03%) was found in tree basil K. Meanwhile, the main chemical composition of lemon basil F was citral (43.45 %) and geraniol (21.23 %). Cluster analysis based on morphological, agronomical and major chemical constituent traits was clustered into two main clusters. First cluster consisted of basil C and bush basil B. The second cluster consisted of A, K, I, D, and F accessions where two accession of tree basil (A, K) placed in the same subcluster, indicated that they are closed to each other. Moreover, lemon basil F is placed in its own subcluster.

200 HARYUDIN, W.
Morphological characteristic of Indian galanga flower (*Kaemferia galanga* L.). *Karakteristik morfologi bunga kencur (Kaempferia galanga L.)/* Haryudin, W.; Rostiana, O. (Balai Penelitian Tanaman Obat dan Aromatika, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* (Indonesia) ISSN 0251-0824 (2008) v. 19(2) p. 109-116, 3 ill., 2 tables; 8 ref.

KAEMPFERIA; FLOWERS; PLANT ANATOMY

The flower of Indian galanga is a complete flower having stamen and pistil reproduction. The research on the biology of Indian galanga flower was conducted in the Greenhouse of Plant Breeding Division, Indonesian Medicinal and Aromatic Crops Research Institute (IMACRI) Bogor from January to December 2007. The parameters observed were number, color, length, and width of petals, color and number of crowns, length and width of crowns, length and width of anthers, length of filament, length of flower, length of receptacle,

diameter of recaptacle, number of fertile and sterile pollens, percentage of pollen fertility and sterility. The data were analyzed using ANOVA. If there was a significant difference, Duncan double distance test would be provided. The result showed that the longest pethal morphology at VI (2.30 cm) was significantly different from V5 but not significantly different from other numbers. Meanwhile, the length of crown in V4 (1.61 cm) is different from V5 but not different with each number. The width and number of petal and crown were not significantly different from every plant's number. The morphology of male and female flowers of each analyzed parameter showed no significantly different. The V2 number produces white color of flower while VI, V3, V4 and V5 produce violet color. The Indian Galanga has complete flower because the stamen and pistil were found in one flower. Male and female flowers bloom in the same time and require 5 hours for receptivity period. Male flower receptivity is shown by yellow color on the anther. On the other hand, receptivity female flower is shown by ligula on the anther which then falls down and leaves is a hole on the anther. Pollen fertility is very high ranging between 97.20- 99.14%.

F60 PLANT PHYSIOLOGY AND BIOCHEMISTRY

201 ERIZAL

Effect of gamma irradiation on the physico-chemical of castor oil. *Pengaruh iradiasi gamma terhadap sifat fisiko-kimia minyak jarak* / Erizal; Dewi S.P.; Anik S. (Pusat Aplikasi Teknologi Isotop dan Radiasi, Jakarta (Indonesia)). [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 261-265, 3 ill., 2 tables; 9 ref. 621.039.8/SIM/p

RICINUS COMMUNIS; CASTOR OIL; GAMMA IRRADIATION; DOSAGE EFFECTS; CHEMICOPHYSICAL PROPERTIES; VISCOSITY; ACIDS; IODINE.

In purpose of expanding the application of radiation in modifying the characters of natural monomer/polymer, the effect of gamma radiation on the physico-chemical properties of castor oil has been studied. The castor oil is one of the potential Indonesia natural sources of which consisted of ± 95% v/v ricinoleic acid ester. The castor oil was packed in the vials and irradiated by gamma rays at the doses of 0; 25; 50; 75; 100; and 150 kGy (dose rate 10 kGy/h). The observed parameters consisted of viscosity; acid number and iod number. The results showed that the viscosity of castor oil increases with the increasing of irradiation dose followed by decrease of its iodine number. This indicated that the monomer of ester ricinoleic acid change to be crosslinked polymer. There was no significant change in acid number.

202 HIDAYAT, C.

Optimization on synthesis of methyl oleate using indigenous biocatalyst from *Jatropha curcas* seeds. *Optimasi sintesis metil oleat menggunakan biokatalis lipase dari kecambah biji Jatropha curcas* L./ Hidayat, C.; Kuntoro, M.D.P.; Hastuti, P. (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Teknologi Pertanian); Sumangat, D.; Hidayat, T. *Jurnal Penelitian Pascapanen Pertanian* (Indonesia) ISSN 0216-1192 (2008) v. 5(2) p. 1-9, 3 ill., 5 tables; 26 ref.

JATROPHA CURCAS; LIPASES; BIOCATALYSTS; ESTERIFICATION; TEMPERATURE; ANALYTICAL METHODS

Jatropha seeds produce lipase during germination. It is useful as lipase resources. Lipase is used for esterification of oleic acid with methanol. However, the optimum condition of the process is not yet known. The objective of the research was to determine the optimum conditions for the synthesis of methyl oleate from oleic acid and methanol using response surface methodology (RSM) and using Box-Behnken type of design with 3 factors. Factors such as molar substrate ratio of oleic acid to methanol, temperature and reaction time were evaluated. The results showed that the effect of temperature, reaction time and substrate molar ratio on the yield of methyl oleate were significant. The most significant effect on yield was substrate molar ratio. The interaction effect of the factors on methyl ester yield was not significant. The optimum conditions for methyl oleate synthesis was at temperature of 39.5°C for 64.4 minutes and the molar ratio of oleic acid to methanol of 2:2. The produced methyl oleate was 522 micromoles. From the verification data, the yield was not significantly different with the predicted data using RSM. It can also be concluded that the acetone-dried germinated jatropha lipase is a potential biocatalyst for the synthesis of methyl ester.

203 RIVAIE, A.A.

Determination of leaf sample position for analysis of P status in physic nut (*Jatropha curcas* L.) seedlings and the available P in the root zone. *Posisi contoh daun untuk analisis status fosfor (P) pada bibit jarak pagar (Jatropha curcas L.) dan kadar P tersedia pada daerah perakarannya*/ Rivaie, A.A.; Karmawati, E. (Pusat Penelitian dan Pengembangan Perkebunan, Bogor (Indonesia)); Rusli. *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2008) v. 14(4) p. 125-130, 1 ill., 2 tables; 27 ref.

JATROPHA CURCAS; LEAVES; PHOSPORUS; SEED; SOIL; PLANT PHYSIOLOGY; CHEMICOPHYSICAL PROPERTIES; PROXIMATE COMPOSITION.

Status of P in plants can be quantified by analyzing concentrations of the nutrient in leaf as the leaf is the most active plant part. Therefore, information on appropriate leaf position as samples for analysis of P status in the plants is needed. A research was conducted to determine an appropriate leaf position of physic nut seedlings and to study differences between the concentrations of available P (Bray-l P) in the bulk soil and the rhizosphere, along with their relationships with the concentrations of leaf P. The experiment was carried out in a glasshouse of Indonesian Spices and Other Industrial Crops Research Institute, Sukabumi, West Java, from September 2006 to July 2007. The experiment was arranged in a completely randomized design with three replications. Each experimental unit consisted of 20 plants. The treatments were: (a) 1st leaf or a leaf located exactly below the shoot, (b) 2^{nd} leaf or a leaf located below the 1^{st} leaf, (c) 3^{nd} leaf, and (d) 4^{th} leaf. All of the leaves were taken from the primary branch of the plants. Parameters measured were P concentrations in the leaf, P concentrations in the bulk soil and the rhizosphere (Bray-1 P). The results showed that the 2^{nd} leaf position was the appropriate leaf position to be taken as samples for the leaf analysis of P status in physic nut (*Jatropha curcas* L.) seedlings. The concentrations of Bray-1 P in the rhizosphere were lower than that in the bulk soil, which is further away from the roots. The R^2 values for the relationships between the Bray-1 P concentrations in the rhizosphere and the 2^{nd} leaf P concentrations were higher than that between the Bray-1 P concentrations in the bulk soil and the 2^{nd} leaf P concentrations, hence, for the objectives to show the soil P availability or to show the relationships between the available soil P and the

concentrations or the P uptake by the physic nut, it will be more accurate if the soil samples are taken from the rhizosphere.

204 SUMANGAT, D.

Characteristics of methyl ester of Jatropha oil obtained from one and two steps transesterification process. ***Karakteristik metil ester minyak jarak pagar hasil proses transesterifikasi satu dan dua tahap***/ Sumangat, D.; Hidayat, T. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Jurnal Penelitian Pascapanen Pertanian* (Indonesia) ISSN 0216-1192 (2008) v. 5(2) p. 18-26, 2 ill., 6 tables; 17 ref.

JATROPHA CURCAS; PLANT OILS; ESSENTIAL OILS; ESTERIFICATION; CHEMICOPHYSICAL PROPERTIES.

Biodiesel (methyl ester) is made mainly through transesterification process of vegetable oil such as jatropha oil and generally uses methanol as reagent and KOH as catalyst. There are one-step and two-steps process using various reaction temperature and molar ratio of methanol to oil. This experiment aimed at comparing physico-chemical characteristic (viscosity, density and acid number) as well as %age of fatty acid esters of methyl esters as its parameters of these two type process. Factorial completely randomized design with two replication was used as experiment design with three variables treatments, namely (A) transesterification steps: (A1) one step, (A2) two steps; (B) reaction temperatues: (B1) 30°C, (B2) 65°C; and (C) molar ratio of methanol to oil: (CI=3:1, C2=4:1, C3=5:1 dan C4=6:1). It was concluded that the best treatment was one step process at 30°C using molar ratio methanol:oil of 5:1. The characteristics of methyl ester were viscosity 3.89 cSt, density 0.88 g/cm^3 and acid number 0.48 mg KOH/g sample. The fatty-acids esters of methyl esters of both processes was the same, i.e. methyl oleic (47.09-47.46%), methyl linoleic (32.20-32.53%), methyl palmitic (18.65-18.93%) and methyl lignoseric (0.28-0.30%). Total percentage of fatty acid esters in methyl ester of one step process was 100% while that of two steps process was 99.62%. This total percentage could indicate as conversion degree of triglyceride into methyl ester. Yield of methyl ester from one-step process was 77.99% which was higher than that of two-steps process (70.80%). In terms of its characteristics and yield of methyl ester, one-step process was better than two-steps process.

205 YUNINGSIH

Cyanide content and stability in picung plant (*Pangium edule* Reinw.) and its usage. ***Kandungan dan stabilitas sianida dalam tanaman picung (Pangium edule Reinw.) serta pemanfaatannya/*** Yuningsih (Balai Besar Penelitian Veteriner, Bogor (Indonesia)). *Perkembangan Teknologi Tanaman Rempah dan Obat* (Indonesia) ISSN 1829-6289 (2008) v. 20(2) p. 102-109, 1 ill., 2 tables; 18 ref.

FLACOURTICEAE; CHEMICAL COMPOSITION; CYANIDES; BOTANICAL PESTICIDES; STORAGE; USES.

Picung (*Pangium edule* Reinw.) is a perennial tree that has some benefit, especially its fresh leaves and seeds as botanical pesticide. Active ingredient of the seed is associated with the presence of cyanide as a result of gynocardin (cyanogenic glycoside) hydrolysis by gynocardase enzyme. Cyanide is one of the most rapid acting poison to human or animal and causes death within minutes to hours of exposure. In order to provide safety method using picung seed as botanical pesticide, it is important to know the content and stability of cyanide in the seed. The cyanide content is determined by soil condition, climate condition,

and seed stucture. The cyanide stability in seed extract considerably decreases during storage. The seeds are widely used for fish preservation, wild dog elimination, rodenticide, molluscicide and growth inhibitor of bacteria.

H10 PESTS OF PLANTS

206 INDARWATMI, M.
Effect of radio-sterilization and transportation on the pupae quality of *Bactrocera carambolae* (Drew and Hancock) (Diptera: Tephritidae) fruit fly. *Pengaruh pemandulan dan cara pengiriman terhadap mutu kepompong mandul lalat buah Bactrocera carambolae* (Drew Hancock) (Diptera: Tephritidae)/ Indarwatmi, M.; Nasution, I.A.; Kuswadi, A.N. (Pusat Aplikasi Teknologi Isotop dan Radiasi, Jakarta (Indonesia)). [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 221-225, 2 ill., 2 tables; 8 ref. 621.039.8/SIM/p

BACTROCERA; STERILE INSECT RELEASE; STERILIZING; IRRADIATION; DOSAGE EFFECTS; HATCHING; PUPAE; TRANSPORT OF ANIMALS.

In the fruit fly control program with sterile insect technique (SIT), a large amount of pupae have to be radiosterilized and then shipped from laboratory to the field to be released. To observe if there is any effect of those treatments to the quality of the pupae, before and after being irradiated with gamma ray, the quality of pupae and the sterility of the male flies were recorded. The treatment was gamma irradiation with the dose of 0, 30, 50, 70, 90, 110, and 130 Gy, and the sterility was measured by observing the percentage of eggs hatched. The results showed that the dose of 90 Gy was an appropriate dose to sterilize the fruit fly. Treatment with this dose on the pupae caused sterility almost 100% on the flies, but with a tolerable decrease in the number of flies that emerged and flied. Before shipment, the radiosteriled pupae were put into plastic bags that were arranged interspaced with iced bottles in a styrofoam box. A max-min thermometer was put in the box to record the temperature during the 20 hour shipment with a public bus. Qualities of the pupae before and after the shipment were observed by recording the emergence and the number of flier. The results showed that the packing and shipment procedure did not significantly affect the pupae quality. The emergence and the number of flies was 69.25% ± 2.22 and 69.00% ± 2.16 before as compare with 63.25% ± 4.65 and 61.25% ± 5.44 after the packing and shipment. This packing and shipment procedure can be used in the application of SIT in the field.

207 INDRIATI, G.
[Some of major pests on macadamia plant (*Macadamia integrifolia*)]. *Beberapa hama utama pada tanaman makadamia (Macadamia integrifolia)/* Indriati, G.; Khaerati (Balai Penelitian Tanaman Rempah dan Aneka Tanaman Industri, Sukabumi (Indonesia)). *Buletin Riset Tanaman Rempah dan Aneka Tanaman Industri* (Indonesia) ISSN 2085-1685 (2008) v. 1(1) p. 36-45, 5 ill., 29 ref.

MACADAMIA TERNIFOLIA; PESTS OF PLANTS; NEZARA VIRIDULA; HYPOTHENEMUS; CRYPTOPHLEBIA; CULTIVATION; PEST CONTROL.

The family of macadamia is Proteaceae including about 10 species and two of which producing edible nuts is *Macadamia integrifolia* and *Macadamia tetraphylla* or hybrids of these. The most important insect pests of macadamia are the southern green stink bug (*Nezara viridula*), tropical nut borer (*Hypothenemus obscurus*), the koa seedworm moth (*Cryptophlebia illepida*) and litchi fruit moth (*Cryptophlebia ombrodelta*). The estimated percentage of crop loss due to *N. viridula* was 25%, *H. obscurus* was 75% and *C. illepida* 17.6 - 50%. The pests attacked macadamia plants caused kernel damage by boring fruits and premature nuts drop. The control method is weed control by reducing weeds or hosts around macadamia, introduce egg parasitoid *Tissolcus basalis* on *Nezara viridula*, predators *Cathartus quadricollis* and *Leptophloeus* spp. on *H. obscurus* and also introduce egg parasitoid *Trichogrammatoidea cruptophlebiae* on *C. illepida* and *C. ombrodelta*.

208 KUSDIAMAN, D.

Adoption of TBS [trap barrier system] as one of rat control technology components in Indonesian Center for Rice Research (ICRR) field station. *Adopsi TBS sebagai salah satu komponen teknologi pengendalian tikus sawah di kebun percobaan BB Padi Sukamandi*/ Kusdiaman, D.; Herawati, N.A. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). [Proceedings of the seminar on rice research results appreciation supporting national rice production increase. Book 1]. Prosiding seminar apresiasi hasil penelitian padi menunjang P2BN: peningkatan produksi beras nasional. Sukamandi (Indonesia), 19-20 Nov. 2007. Buku 1/ Suprihatno, B.; Daradjat, A.A.; Suharto, H.; Toha, H.M.; Setiyono, A.; Suprihanto; Yahya, A.S. (eds.) Sukamandi (Indonesia): BB Padi, 2008: p. 447-456, 4 tables; 17 ref 633.18.001.57/SEM/p bk1

ORYZA SATIVA; RODENTS; RODENTS CONTROL; PEST CONTROL EQUIPMENT; TECHNOLOGY TRANSFER; LOWLAND; ECOSYSTEMS; JAVA.

Rice field rat (*Rattus argentiventer*) has been recognized as the most destructive pest in majority rice production areas in Indonesia. Information on the long term seasonal rat population dynamic over large areas of rice irrigation ecosystem is extremely important as basic understanding for controlling rodent pests. This paper provides a review on management of rice field rat controls over large areas in lowland rice irrigated ecosystem. The study was conducted in Rancajaya and Rancamulya villages at Patokbeusi subdistrict, Subang district during the period of March to June 2007. The study site assessed was very large area (285 ha), which belongs to 23 farmer groups. One farmer group leader managed every single farmer group, which covers about 9-15 ha of rice farm. Various rodent pest control techniques implemented were (l) using trap brier sstem (TBS), daily rat captured was killed and recorded; (2) setting up LTBS (lnier tap barrier system) and record the similar things to the TBS; (3) weekly mass hunting, total rats killed were counted and combined, with the ones from LTBS. The study concluded that: (1) the total number of rats captured within a season were 4,183 rats; accounted 1,460 rats captured by TBS and 2,723 rats from LTBS and mass hunting; (2) the peak population of rats occurred only once within the entire cropping season; and (3) the average of rice yield was 5.81 t/ha as the impact on adopting of rat controls.

209 NASUTION, I.A.

Use of *Bactrocera carambolae* (Drew and Hancock) larvae to trap and to monitor the parasitoids of *Fopius arisanus* (SONAN) and *Diacharismimorpha longicaudata* (ASHMEAD) in the field. *Penggunaan larva lalat buah Bactrocera carambolae (Drew and Hancock) untuk menangkap dan memonitor parasitoid Fopius arisanus (SONAN)*

***dan Diacharismimorpha longicaudata (ASHMEAD) di kebun*/** Nasution, I.A.; Indarwatmi, M.; Kuswadi, A.N. (Pusat Aplikasi Teknologi Isotop dan Radiasi, Jakarta (Indonesia)). [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 227-233, 2 ill., 3 tables; 8 ref. 621.039.8/SIM/p

BACTROCERA; LARVAE; BIOSTERES LONGICAUDATUS; OPIUS; TRAPS; PEST SURVEYS; PARASITOIDES; PARASITISM; FIELD EXPERIMENTATION.

The use of *B. carambolae* fruit fly larvae of different instars on artificial diet and infested on carambola fruits put in carambola orchad to trap and to monitor the presence of *F. arisanus* and *D. longicaudata* parasitoids were tested. The parasitoids in the field were expected to lay eggs on the fruit fly larvae, so that the number of spring on the host could be observed in the laboratory. Only larvae in the fruits were able to trap parasitoids, while those on artificial diet were not. Both of *D. longicaudata* and *F. arisanus* were collected from the 1st - 3rd instar larvae showing that the parasitoids laid eggs on those instar, however *F. arisanus* tend to prefer the 1st instar. In two hectar orchad with ± 19.16% level of parasitism and 20 trap fruits, the parasitoids were trapped on about 10 fruits (50%). The number of parasitoids collected increased in the connection with the increase of parasitism level in the field, however to be used in a monitoring program, the relationship between the two have to be studied further. Results in this preliminary observation showed that by this system, parasitoids were only trapped when the level of parasitism was higher than 15%.

210 NATASASMITA, S.

Citrus nematode (*Tylenchulus semipenetrans* Cobb.) caused slow decline disease on citrus: distribution and the study that relation with the controlling. *Nematoda jeruk (Tylenchulus semipenetrans Cobb.); penyebab penyakit slow decline pada tanaman jeruk: distribusi dan penelitian yang berhubungan dengan pengendaliannya*/ Natasasmita, S. Bandung (Indonesia): UNPAD, 2008: 51 p. 634.31-295.5/NAT/n

CITRUS; TYLENCHULUS SEMIPENETRANS; PESTS OF PLANTS; PLANT DISEASES; SOIL SURVEYS; PAECILOMYCES; ROOT ROTS; CONTROL METHODS.

Productivity of the citrus in Indonesia is between 8.6 - 15 ton/ha/year. Yield of citrus in USA and Brazil are 20-30 ton/ha. Reduction of yield of citrus is caused by fungi, bacteria, virus, and nematode. The citrus nematode (*T. semipenetrans*) caused slow decline disease. The objectives of the research were to find out the population distribution data of *T. semipenetrans* in citrus fields in West Java, to find out the resistant citrus cultivar, to find out Paecilomyces dose to control *T. semipenetrans*, and to find out the concentration of plant extracts that can suppres *T. semipenetrans* in the soil and female on root. The research used survey method. Survey of the soil samples was done in eight districts in West Java. Screening of citrus cultivar, application of Paecilomyces and plant extracts were done in the laboratory and the greenhouse of Plant Pests and Diseases Department, Faculty of Agriculture, Padjadjaran University. The result showed that *T. semipenetrans* was found in the citrus fields in West Java (Ciamis, Kuningan, Cirebon, Sumedang, Bogor, Sukabumi, Bandung, and Garut). *Citrus jambhiri*, *C. reticulata*, *C. auranticum*, *C. macrocarpa*, *C. medica*, *C. hystrix* ABC were resistant to *T. semipenetrans*. Paecilomyces with dose of 4 g/pot suppressed the number of *T. semipenetrans* female that penetrate on citrus root. Extracts of *C. annuum, A. sativum, A. indica, N. tabacum* on S/4 concentration suppressed

the number of juveniles second stage of *T. semipenetrans* in 100 ml of soil and the number of *T. semipenetrans* female that penetrate on citrus root.

211 SUBIYAKTO

Cotton insect pest control by using paddy straw mulch. *Pengendalian hama kapas menggunakan mulsa jerami padi*/ Subiyakto; Indrayani, I G.A.A. (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)). *Perspektif* (Indonesia) ISSN 1412-8004 (2008) v. 7(2) p. 55-64, 9 ill.; 31 ref.

GOSSYPIUM HIRSUTUM; GLYCINE MAX; RICE STRAW; MULCHES; PEST CONTROL; INTERCROPPING; BIOLOGICAL CONTROL.

Insect pest management and cultural techniques have been applying for plant management based on natural ecosystem properties. Habitat manipulation by applying paddy straw mulch is one of biological approach to increase microclimate environment become suitable for growth and development of soil arthropod pupulation. Paddy straw mulch of 6 ton/ha enhanced the role of soil microarthropods and predators, reduced the frequency of pest population threshold, and decreased the chemical insecticide application for insect control by 57%. Straw mulch can also be used to maintain moisture and temperature of soil surface needed by arthropod for their population development. Cotton yield increased by 21%, while soybean yield of 31% in cotton intercropped with soybean when paddy straw mulch was applied before planting during cotton season. Sanitation by burning paddy straw after harvest could make the soil environment unsuitable for growth and development of soil microorganisms due to killed by this activity.

212 SUHARSONO

Relationship between trichome densities and pod damage by soybean pod borer *Etiella zinckenella*. *Hubungan kerapatan trikoma dengan intensitas serangan penggerek polong kedelai*/ Suharsono (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia) ISSN 0216-9959 (2009) v. 28(3) p. 176-182, 4 ill., 2 tables; 33 ref.

GLYCINE MAX; PESTS OF PLANTS; TRICHOMES; DENSITY; DAMAGE.

An experiment was conducted in a glasshouse of the Indonesian Legumes and Tuber Crops Research Institute (ILETRI) using eight soybean genotypes and three soybean varieties, i.e. Jayawijaya, Bromo, and Wilis. Pod damage and trichome densities of each genotype were observed to determine their relationships. Each of the eight genotypes were grown in 12 kg polibags containing fertile soil and maintained in 4m x 4m x 2m screen cage. At pod development stage (R6), each genotype was infested with a pair of virgin pod borer. The experiment was laid in a complete randomized design (CRD) with three replicates. Number of eggs laid, larvae, pod and seed damages, and trichome densities varied among the soybean genotypes. A total of 98 eggs were found in Wilis variety. Number of eggs laid on genotypes Jayawijaya, Bromo, IAC-100, IAC-80-596-2 and MLG 3036 was 3-10 eggs/plant less than that on Wilis. Pod damage on Wilis variety was approximately 80%, while on IAC-100, IAC-80-596-2, MLG 3032 and Bromo each was 9-11%. The number of egg, larvae, and pod damages were related to the trichome densities. Genotypes had denser trichomes than Wilis variety resulted in less number of eggs. The high number of eggs and larvae resulted in the highest pod damages, while the denser trichomes had reduced the pod damage. Numbers of egg and larvae were positively correlated with pod damages, with r = 0.99 and r = 0.92,

respectively, and were negatively correlated with trichome densities, with r = -0.75 and r = -0.72 respectively. The denser trichomes is beneficial in controlling pod borer attack. Soybean pods with less trichomes are potentially suffer more damages, thus is more susceptible to pod borer. In breeding for pod borer resistance, trichome density can be used as a criterion for selections in the selection process.

213 SUHARTO, H.

Status of the rice stemborer in Indonesia. *Status hama penggerek batang padi di Indonesia*/ Suharto, H.; Sembiring, H. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). [Proceedings of the seminar on rice research results appreciation supporting national rice production increase. Book 1]. Prosiding seminar apresiasi hasil penelitian padi menunjang P2BN: peningkatan produksi beras nasional. Buku 1. Sukamandi (Indonesia), 19-20 Nov. 2007/ Suprihatno, B.; Daradjat, A.A.; Suharto, H.; Toha, H.M.; Setiyono, A.; Suprihanto; Yahya, A.S. (eds.). Sukamandi (Indonesia): BB Padi, 2008: p. 61-71, 1 table; 16 ref. 633.18.001.57/SEM/p bk1

ORYZA SATIVA; STEM EATING INSECTS; SPECIES; INTEGRATED PEST CONTROL; INSECTICIDES; MATING DISRUPTION; SEX PHEROMONES; MONITORING.

The rice stemborer is insect pest which exists in every rice agroecosystem. In Indonesia, the average damage in the last 10 years was 84,952 ha. There were six species of the rice stem borer in rice field in Indonesia, four of them changed their domination dynamically. In 2007 in Java, larva population in the rice stemborer was 90 % belong to the yellow stemborer *Scirpophaga incertulas* W (Lepidoptera: Pyralidae), and the rest was the pink stemborer (*Sesamia inferens*). Basically, the integrated pest management was the concept for controlling of the stemborer. However, the technology component was limited for implementation and the application of insecticide became the main technology practiced by farmers. Unproper insecticide application was causing the insecticide control was not effective. Monitoring moth population either by light trap or by sex pheromone trap complemented by plant damage record was essential to decide insecticide application. As the yellow stemborer was more than 90% of larva population, then using semiochemical by mass trapping could control this stemborer infestation.

H20 PLANT DISEASES

214 DJATNIKA I.

Effect of banana rachis on development of powdery mildew and black spot on rose plant. *Pengaruh rachis pisang terhadap perkembangan penyakit embun tepung dan bercak hitam pada daun mawar/* Djatnika, I. (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)). *Jurnal Hortikultura* ISSN 0853-7097 (2008) v. 18(2) p. 221-226, 2 tables; 17 ref.

ROSA; SPAEROTHECA; DIPLOCARPON; DISEASE CONTROL.

Powdery mildew and black leaf spot are the important diseases on rose plant. Banana rachis was reported to be able to reduce some plant diseases and has potency to be developed for disease control method which is easy to apply and environmentally friendly.The objective of the research was to find out the effect of banana rachis extract to control powdery mildew and black spot on rose plant var. Black Magic. The results indicated that 10% of banana

rachis extract was able to control the powdery mildew, but not on the black spot disease intensity.

215 ILYAS, S.

Effectiveness of botanical pesticides and biological agents to control rice seedborne pathogens in vitro. *Efektivitas pestisida nabati dan agens hayati dalam mengendalikan patogen terbawa benih padi secara in-vitro*/ Ilyas, S (Institut Pertanian Bogor (Indonesia)); Kadir, T.S.; Yukti, A.M.; Fiana, Y.; Fadhilah, S.; Nugraha, U.S.; Sudarsono. [Proceedings of the seminar on rice research results appreciation supporting national rice production increase. Book 1]. Prosiding seminar apresiasi hasil penelitian padi menunjang P2BN: peningkatan produksi beras nasional. Sukamandi (Indonesia), 19-20 Nov 2007. Buku 1/ Suprihatno, B.; Daradjat, A.A.; Suharto, H.; Toha, H.M.; Setiyono, A.; Suprihanto; Yahya, A.S. (eds.) Sukamandi (Indonesia): BB Padi, 2008: p. 457-476, 10 ill.; 8 tables; 23 ref 633.18.001.57/SEM/p bk1

ORYZA SATIVA; VARIETIES; SEED; IN VITRO CULTURE; PATHOGENS; BOTANICAL PESTICIDES; BIOLOGICAL CONTROL AGENTS; PHYTOTOXICITY.

Studies were carried out: (1) to obtain an effective botanical pesticide or biological agent to control seedborne pathogens of rice without causing phytotoxic; (2) to develop an effective method for seed health testing of rice, especially seedborne, *Alternaria padwickii* and *Xanthornonas oryzae pv.oryzae*. Seed samples of various rice varieties were taken from several locations. Seed health testing to identify seedborne fungi was conducted by using blotter test and agar test while to identify *X. oryzae pv.oryzae* four methods were used (filter paper, roll towels, grinding, and grinding followed with centrifuge). In order to evaluate phytotoxicity effects of botanical pesticides used in this experiment, clove oil and fragrant grass oils with concentration of 0% 0.2%, 0.5%, 0.8%, 1%, 2%, 3%, 4%, and 5% were tested on rice seeds. The botanical pesticides were incorporated in matriconditioning by using ratio of seeds to burned rice hull powder to clove/fragrant grass oils of ; 0.8; and 1.2. In vitro tests were conducted to evaluate the ability of the botanical pesticides (clove/fragrant grass oil with concentrations of 0%, 0.5%, 1.0%, 1.5% ,2.0%, and 2.5%) or biological agents (code 51/B and 11/C of ICRR) in preventing growth of seedborne fungi and *X. oryzae pv. oryzae* by using PDA and Wakomoto media, respectively. Results of experiments showed that the best seed health testing method to detect seedborne fungi is blotter test while to detect *X. oryzae pv.oryzae* is grinding method. Clove oil or fragrant grass oil 0.5% up to 2.0% incorporated in matriconditioning could prevent 100% growth of *X. oryzae pv.oryzae, A. padwickii, D. oryzae* and *F. moniliforme* without causing phytotoxicity. Isolate 51/B couId prevent growth of *X. oryzae pv.oryzae* pathotype IV while isolate II/C could not. Both isolates could prevent growth of *A. padwickii* and *D. oryzae*, however could not prevent *F. moniliforme.*

216 ISTIFADAH, N.

Use of rhizosphere and endophytic bacteria and fungi from grass roots to control clubroot disease (*Plasmodiophora brassicae*) in cabbage. *Pemanfaatan jamur dan bakteri rhizosfer serta endofit akar rumput-rumputan untuk pengendalian penyakit akar gada (Plasmodiophora brassicae) pada tanaman kubis*/ Istifadah, N.; Yulia, E.; Widiantini, F. Bandung (Indonesia): UNPAD, 2008: 39p. 635.34-24/IST/p

BRASSICA OLERACEA CAPITATA; RHIZOSPHERE; ENDOPHYTES; PLASMODIOPHORA BRASSICAE; BIOLOGICAL CONTROL; GRASSES; ISOLATION.

Clubroot disease caused by *Plasmodiophora brassicae* Worr. is one of limiting factors in cabbage production. The disease is difficult to be controlled as the resting spores of the pathogen can survive in the soil for long period. Integrated disease control, therefore, is required. Biological control (biocontrol) is one component of integrated control of clubroot disease. Grasses are potential sources of biological control agents. The aim of this study was to obtain isolates of rhizosphere and endophytic fungi and bacteria for biological control of clubroot disease in cabbage. The experiments were conducted in Phytopathology Laboratory, the Department of Plant Pests and Diseases, Faculty of Agriculture, University of Padjadjaran, from March to November 2008. Rhizosphere and endophytic bacteria and fungi were isolated from roots or rhizosphere of grasses such as cogon grass, elephant grass and mixed grasses. The isolates obtained were examined on their effects on cabbage. The isolates that increase the growth of cabbage were further tested for their abilities to control clubroot disease in cabbage. The experiment was conducted for each kind of microorganism separately. The experiment was arranged in randomized completely design with isolates and control as treatments. Each treatment contained three replicates in which five plants were used in each replication. The result showed that among the root endophytic bacteria tested, two isolates (CTK3 and AJ3) increased the growth of cabbage and suppressed clubroot intensity by 59.2% and 73.2% respectively. Among the rhizosphere bacteria tested, three isolates (AJ1, AJ3 and RGJ1) increased the growth of cabbage and suppressed the intensity of clubroot disease by 37.18% - 43.12%. Among the root endophytic fungi examined, two isolates (AGK1 and AAJ1) suppressed the clubroot intensity by 49.6% and 51.2% respectively.

217 MOTULO, H.F.

Morphology and molecular characteristics of *P. palmivora* isolates from coconut and cacao. *Karakter morfologi dan molekuler isolat Phytophthora palmivora asal kelapa dan kakao/* Motulo, H.F. (Balai Penelitian Tanaman Kelapa dan Palma Lain, Manado (Indonesia)); S-Sinaga, M.; Hartana, A.; Suastika, G.; Aswidinnoor, H. *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2007) v. 13(3) p. 111-118, 4 ill., 7 ref.

COCOS NUCIFERA; THEOBROMA CACAO; PHYTOPHTHORA PALMIVORA; BIODIVERSITY; DNA; FUNGAL MORPHOLOGY

Phytophthora palmivora is the pathogen of coconut nutfall and cacao black pod diseases. This study was conducted to differentiate the isolates of *P. palmivora* from coconut and those from cacao fruit based on morphology and molecular characteristics. Samples of nutfall of coconut and black pod of cacao were collected from Banyuwangi and Jember Districts, East Java, Minahasa and Bolaang Mongondow Districts, North Sulawesi, and Gorontalo District, Gorontalo. Morphological analysis, DNA extraction and amplification of PCR-DNA were conducted in Mycology and Virology Laboratory, Plant Protection Division, Faculty of Agriculture, Bogor Agriculture University. Sequencing DNA analysis was conducted in Molecular Biology Laboratory, Indonesian Center for Agricultural Biotechnology and Genetic Resources Research and Development and Biotechnology Laboratory-Indonesian Institute of Sciences Serpong. This research was conducted from April 2005 to February 2007. Comparative morphological evaluated i.e. diameter of colony, length and width of sporangium, l/w ratio, type of colony and internal transcribed sequence (ITS)-DNA showed that all isolates of *Phytophthora* isolated from coconut and cacao in

Indonesia were *Phytophthora palmivora*. Morphology characteristics of pathogen isolates from cacao were smaller and significantly different in length, width, length/width ratio of sporangium and diameter of colony compared to coconut's isolates. Sporangia of 22 isolates were caducous with short pedicel, but were variable in shape and size. The culture produced ovoid, limoniform, obturbinate, dan obpyriform sporangia, average 40-62 micro m in length and 28-43 micro in width. The colony types were stelate, cottony and rossaceous with average diameter of coconut isolates 54.8 cm and cacao isolates 43.4 cm. Specific fragment of 900 bp was successfully amplify from coconut and cacao infected by *P. palmivora*. The DNA sequence analysis of the nuclear ribosomal internal transcribed spacer (ITS) region showed that the coconut isolates were not in the same cluster with the cacao isolates. Based on sequence analysis, the *P. palmivora* isolates from Indonesia showed different cluster from those of Taiwan, Ghana, Puerto Rico and Costa Rica isolates.

218 MUIS, A.

Management of banded leaf and sheath blight disease caused by *Rhizoctonia solani* Kuhn. on corn. *Pengelolaan penyakit busuk pelepah (Rhizoctonia solani Kuhn.) pada tanaman jagung*/ Muis, A. (Balai Pengkajian Teknologi Pertanian Sulawesi Tengah, Palu (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* (Indonesia) ISSN 0216-4418 (2007) v. 26(3) p. 100-103, 2 ill., 1 table; 22 ref.

ZEA MAYS; RHIZOCTONIA SOLANI; DISEASE CONTROL.

The control of diseases caused by *Rhizoctonia solani* on a number of plant species has been carried out. Banded leaf and sheath blight disease caused by *R. solani* on corn has become increasingly severe and economically threatened corn plants in several countries of Asia and other parts of the world. This paper discussed several approaches which have been done to control the disease caused by *R. solani*. The management controls consist of quarantine, farming practice, resistant varieties, chemical, and biological control. Most of those control approaches have successfully controlled diseases caused by *R. solani*.

219 PAKKI, S.

Effectiveness of propionic acid, ammonia, and clove leaf extract to control seedborne *Aspergillus flavus* in maize. *Efektivitas amonia, asam propionat, dan ekstrak daun cengkeh dalam pengendalian Aspergillus flavus pada jagung/* Pakki, S. (Balai Penelitian Tanaman Serealia, Maros (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia) ISSN 0216-9959 (2009) v. 28(3) p. 158-164, 6 tables; 24 ref.

ZEA MAYS; PLANT DISEASES; EXTRACTS; LEAVES; ASPERGILLUS FLAVUS; PROPIONIC ACID; AMMONIA; YIELDS.

The objective of the study was to determine the effect of ammonia, propionic acid, and extract of clove leaves on *Aspergillus flavus* of maize. The study was carried out in two steps; in laboratory experiment and the field. Laboratory experiment was done in the Pests and Diseases Laboratory of Indonesian Research Center of Cereals Crops to isolate pathogenic *A. flavus*. The isolate was then used as an inoculum source. The field trial was done at Pangkep Mandalle, South Sulawesi. The trial was arranged in a split plot design with four replications. The main plots were: (1) clove leaf extract, (2) ammonia, and (3) propionic acid. The subplots were concentrations of: (1) clove leaf extract (0; 6; 10; 14 g/l); (2) ammonia (0.1, 0.5, and 2.0 ml/l), and propionic acid (0.1, 0.5, and 2.0 ml/l). Seeds of maize variety Anoman, which is susceptible to *A. flavus*, were grown as border plants. Three weeks

before planting, the trial plots were prepared in 3 m x 4 m plots and planted with Anoman variety on a 75 cm x 20 cm plant spacing, two seeds/hill. The pesticide treatments were done at 35 days after planting (DAP) or prior to the silking stage and at 65 DAP (after the maize cobs were fully developed). The results indicated that clove leaf extract was not effective to control *A. flavus*. Water suspension of either ammonia or propionic acid at the vegetative stage (35 DAP) and generative stage (65 DAP) of maize plants at rates of 1.5 and 2.0 ml/l reduced maize plant and seed infections. The *A. flavus* infection reduced the maize seed quality, but not the maize yield.

220 SUDIR

Identification of *Xanthomonas oryzae pv. oryzae pathotypes* the causing organism of rice bacterial leaf blight in rice production center of Java (Indonesia). ***Identifikasi patotipe Xanthomonas oryzae pv. oryzae, penyebab penyakit hawar daun bakteri di sentra produksi padi di Jawa*****/** Sudir; Suprihanto; Kadir, T.S. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan (Indonesia)* ISSN 0216-9959 (2009) v. 28(3) p. 131-138, 3 tables; 14 ref.

RICE; IDENTIFICATION; BLIGHT; PLANT DISEASES; XANTHOMONAS ORYZAE; JAVA.

Rice bacterial leaf blight is an endemic disease rice producing area in the tropics. One hundred and thirty two bacterial isolates of *Xanthomonas oryzae pv.oryzae* (Xoo), the causal organism of rice bacterial leaf blight (BLB) were collected from farmers rice fields. This study was aimed to study the diversity of pathotypes of Xoo. The study was conducted during the dry season (DS) of 2007 using survey method with sampling of rice infected by BLB. Xoo pathotype identification was done by inoculating the isolates of Xoo on differential varieties in the screen field by the leaf cutting methods, using the 48 hours old cultures as inoculants in wet season (WS) 2007/2008. Disease severity was evaluated on 15 days after the inoculation. Disease severity of <11%, was considered as resistant (R) and over 11% was considered as susceptible (S). A total of 132 isolates were identified, of which 31 isolates (23.5%) were identified as pathotype III; 21 isolates (15.9%) were pathotype IV, and 80 isolates (60.6%) were pathotype VIII. Pathotype structures of Xoo indicated that in West Java there were 47 isolates, of which 11 isolates (23.4%) were identified as pathotype III, 13 isolates (27.7%) as pathotype IV, and 23 isolates (48.9%) as pathotype VIII. In Central Java there were 34 isolates, of which 6 isolates (17.7%) as pathotype III, 8 isolates (23.5%) as pathotype IV, and 20 isolates (58.8%) as pathotype VIII. In Yogyakarta there were 10 isolates, consisted 5 isolates (50%) pathotype III and 5 isolates (50%) pathotype VIII, and no pathotype IV was found. In East Java there were 41 isolates, consisted of 9 isolates (22%) as pathotype III, 32 isolates (78%) as pathotype VIII, and no pathotype IV was found. Except for Yogyakarta there was indication that pathotype VIII was common in places of low and medium elevation, while pathotype III and IV were typically found in places with low elevation. This information would be important in relation with the development of rice varieties resistance to specific strain (pathotype) of Xoo.

221 SUNARTO, T.

Identification of the disease and pest caused destruction on snake fruit (*Salacca edulis*) in Tasikmalaya (Indonesia). ***Inventarisasi penyakit dan OPT (organisme pengganggu tanaman) penyebab kerusakan pada tanaman salak di Tasikmalaya*****/** Sunarto, T.; Hartati, S.; Djaya, L. Bandung (Indonesia): UNPAD, 2008: 51p. 634.61-27(594.53)/SUN/i

SALACCA EDULIS; PESTS OF PLANTS; PLANT DISEASES; PATHOGENS; AGROECOSYSTEMS; DISEASE SURVEYS; PEST SURVEYS; SOIL SURVEYS; JAVA.

The snake fruit (*Salacca edulis*) is planted in Tasikmalaya, West Java. The diseases and pests of snake fruit plants are not known up to now. The objective of this research was to collect the diseases, pathogens, and pests causing damage on snake fruit. The research used survey method. Plant diseases and pests samples were taken from Tasikmalaya (Bantar Kalong, Cikalong, Salopa, Manonjaya, and Cineam). The result showed that the diseases on snake fruit consisted of grey spot, leaf spot (cercospora spot), ring spot, red rust, green lichen, sooty mold, grey spot ("bercak kelabu") and fruit rot. The pathogens damaged snake fruit consisted of *Pestalotia* sp. (leaf spot), *Cercospora* sp. (leaf spot), *Alternaria* sp. (ring spot), *Lichen* sp., *Capnodium* sp. (sooty mold), *Pestalotiopsis* sp. (grey spot), and *Monilinia* sp. (fruit rot). The pests damaged snake fruit consisted of *Chilochorus melanophthalmus*, *Pyrochroa*, *ulat kilan*, *Ferrisia virgata*, *Aphididae*, *Stagmomantis carolina* L., snails, *ulat kantong*.

222 SUPRIHANTO

Virulency of rice tungro virus isolates from three endemic areas in Indonesia. *Virulensi virus tungro dari tiga daerah endemis di Indonesia*/ Suprihanto; Widiarta; Kusdiaman, D. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). [Proceedings of the seminar on rice research results appreciation supporting national rice production increase. Book 1]. Prosiding seminar apresiasi hasil penelitian padi menunjang P2BN (peningkatan produksi beras nasional). Sukamandi (Indonesia), 19-20 Nov 2007. Buku 1/ Suprihatno, B.; Daradjat, A.A.; Suharto, H.; Toha, H.M.; Setiyono, A.; Suprihanto; Yahya, A.S. (eds.) Sukamandi (Indonesia): BB Padi, 2008: p. 527-537, 4 ill.; 2 tables; 14 ref. 633.18.001.57/SEM/p bk1

ORYZA SATIVA; VARIETIES; RICE TUNGRO VIRUS; TUNGRO DISEASE; PATHOGENICITY; ENDEMICS; EVALUATION; DISEASE SURVEYS; INDONESIA.

Tungro is a composite disease of rice induced by dual infection with rice tungro bacilliform virus (RTBV) and rice tungro spherical virus (RTSV). RTBV causes the tungro symptoms, including yellow orange discoloration and plant stunting. RTSV alone causes no clear symptom except very mild stunting, but it enhances the symptoms caused by RTBV. The aim of this research was to differentiate tungro isolates from several tungro endemic regions in Indonesia. Three isolates of tungro were collected from tungro endemic regions in Indonesia (Manokwari, Medan, and Serang) and maintained on rice cultivar TN1 in greenhouse by successive transfers via *Nephotettix virescens* (Distant). The isolates were inoculated on the rice cultivar FK135 and TN1 to compare their symptom on and/or infectivity to the differential cultivars. Three weeks after inoculation plants responses were observed. The result of this study showed that virulence of virus tungro isolate from Medan was similar to Manokwari isolate. So, Medan and Manokwari tungro virus isolates were more virulent than Serang tungro virus isolate. By molecular assay with PCR RFLP shown that Medan isolate was different with Serang and Manokwari isolates in profile of DNA fragment.

H50 MISCELLANEOUS PLANT DISORDERS

223 MUNARSO, S.J.

Study of pesticide residue content on cabbage, carrot, and tomato at Malang-East Java and Cianjur-West Java (Indonesia). *Studi kandungan residu pestisida pada kubis, tomat,*

dan wortel di Malang dan Cianjur/ Munarso, S.J.; Miskiyah; Broto, W. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Buletin Teknologi Pascapanen Pertanian* (Indonesia) ISSN 1858-3504 (2009) v. 5(1) p. 27-32, 3 ill., 4 tables; 16 ref.

CABBAGES; CARROTS; TOMATOES; PESTICIDES; RESIDUES; YIELDS; GAS CHROMATOGRAPHY; JAVA.

Pesticide can reduce pest population quickly so pest widespreading can be prevented. Pesticide can be absorbed by plants as residue that can be consumed by human through the food intake. Pesticide residues have adverse effect to human health. Long-term consumption can affect nerve system and enzyme metabolism. The aim of this research was to observe the incidence of pesticide residue of cabbage, tomato, and carrot in Malang (East Java) and Cianjur (West Java). The research was conducted through field surveys. Samples were taken randomly from farmers, traders, and supermarkets, 3 samples each. Samples (2 kg each), kept in an ice box, and transferred immediately to laboratory for pesticide residue analysis using gas chromatography (GC). Seventeen active materials from three groups of pesticides (organochlorine, organophosphate and carbamate) were used. Results were compared with maximum residue limit (MRL) according to SNI 7313:2008. Result indicated that endosulfan residues were found in cabbage taken from both Malang and Cianjur with the highest content of 7.4 ppb. Other pesticide residues detected were chlorpiriphos active materials known as methidathion, malathion, and carbaryl. Carrot sample analysed contained endosulfan active materials.

J10 HANDLING, TRANSPORT, STORAGE AND PROTECTION OF AGRICULTURAL PRODUCTS

224 RATULE, M.T.

Milling quality of hulled rices in Southeast Sulawesi: a case study at Prima Tani area in Karandu, Konawe Districts [Indonesia]. ***Mutu giling beberapa varietas padi di Sulawesi Tenggara: studi kasus di lokasi Prima Tani Karandu, Kabupaten Konawe***/ Ratule, M.T.; Abidin, Z.; Wahab, A. (Balai Pengkajian Teknologi Pertanian Sulawesi Tenggara, Kendari (Indonesia)). [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.). Sukamandi: BB Padi, 2009: p.1489-1495, 2 tables; 10 ref. 633.18-115.2/SEM/i bk4

RICE; VARIETIES; MILLING; QUALITY; RICE HUSKS; POSTHARVEST DECAY; CONSUMER BEHAVIOUR; SULAWESI.

Milling quality plays an important role in determining the level of consumer acceptance to the hulled rice. Variety is a factor that can affect milling quality of hulled rice produced. The aim of the research was to evaluate the milling quality of the hulled rice of several varieties of rice planted in Prima Tani area in Karandu, Wawotobi Subdistrict, Konawe District, Southeast Sulawesi. The varieties observed were Konawe, Cisantana, Mekongga, Cigeulis, and Ciherang. The data observed were finest quality rice, broken rice, rice bits, moisture content, and the value of the length-width ratio. The results showed that the finest quality rice (97.48%) of Cisantana was the highest and the broken rice (1.38%) and the rice bits (1.15%) were the lowest. Meanwhile, the lowest of the finest quality rice (91.37%) and the

highest of rice bits were showed by the variety of Konawe. The highest broken rice was showed by Mekongga and Ciherang varieties, with 3.47% and 3.48%, respectively. The variety of Cisantana showed the best milling quality, especially in Prima Tani area of Karandu. The lowest milling quality was showed by the variety of Konawe.

225 SUTRISNO

Potency of the new superior rice variety of Cigeulis for rice quality production. ***Potensi gabah varietas unggul baru Cigeulis dalam menghasilkan beras giling bermutu baik/*** Sutrisno; Achmad, D.R. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)); Raharjo, B. [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.). Sukamandi: BB Padi, 2009: p.1517-1524, 1 ill., 6 tables; 7 ref. 633.18-115.2/SEM/i bk4

RICE; HIGH YIELDING VARIETIES; RICE HUSKS; MILLING; QUALITY; DRYING; MOISTURE CONTENT; DRYERS.

The rice variety of Cigeulis is one of the new high yielding varieties which is preferred most by farmers. The variety has good taste, sticky texture, high yield, and high quality. The experiment on the potency of Cigeulis varieties was done at ICRR in 2007. The wet grain of Cigeulis was harvested in Majalengka District, in July 31 2007. The wet grain was continuously dried in two methods of drying, that was by machine and sun drying. A total of 1,080 kg of wet grains were dried in drying machine and 720 kg were by the sun. The average of the initial moisture content of the wet grains was 20.6% and the average final moisture content of the dried grains dried in machine and by the sun were 12.80% and 14.0%, respectively. The average air drying during the process of drying machine was 40°C, with 7.73 mpm average of air drying flow and the dense of bulk grains in the drying chamber of 30 cm. The drying process was done in 6 hours. The sun drying was done at the average temperature of 30.23°C for 6 hours, with the turning over process of every 2 hours, and the thickness was 2-3 cm. Milling test was done 15 hours after the drying using the double-pass commercial type miller. The results of this experiment showed that the rice quality of Cigeulis dried in machine and by the sun were 86.78% and 84.66%, respectively, with the average of 85.72%. It was concluded that grain of Cigeulis was potential to produce high quality rice (85.72%).

226 WIBOWO, P.

Postharvest handlings of rice in the rice milling unit in Java and Bali [Indonesia]. ***Penanganan pascapanen di tingkat penggilingan padi di beberapa provinsi Jawa dan Bali/*** Wibowo, P. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.). Sukamandi: BB Padi, 2009: p. 1359-1373, 5 tables; 8 ref. 633.18-115.2/SEM/i bk4

RICE; POSTHARVEST TECHNOLOGY; MILLING; RICE HUSKS; QUALITY; TRADITIONAL TECHNOLOGY; JAVA; BALI.

The aim of this research was to evaluate the postharvest handling in the rice milling unit (RMU) in Indonesia. The research was carried out through a survey method, followed by the quality analysis of milled rice in the laboratory. The survey was conducted in West Java (5 districts), Central Java (5 districts), Yogyakarta Special Region (2 districts), East Java (5 districts), and Bali (3 districts). In each district a total of 15-20 respondents of RMU were selected. The results showed that from a total of 332 respondents, the majority of RMU have been operated for more than 10 years, and some even for more than 20 years. The RMU was operated by their own family. Rice characters preferred were long grain size and slender shape, which match to those of IR-64, Ciherang, Memberamo, and Way Apo Buru varieties. The majority of RMU dried the rice grain by sun drying. Generally, the thickness of rice layer during drying was about 3-5 cm, but some were less than 3 cm. The milling process done with two rice husking processes and two times rice polishing was conducted mostly in the RMU respondents. Generally, the moisture content prior to milling process was 14% or less. Almost all of the milled rice quality classification at the RMU level met to the class IV-V of SNI standard No. 01-6128-1999. The low quality of milled rice was caused by highly broken rice content.

J11 HANDLING, TRANSPORT, STORAGE AND PROTECTION OF PLANT PRODUCTS

227 NUGRAHA, S.

Evaluation of rice quality in West Java, Central Java, and East Java (Indonesia) harvested in dry season 2007. ***Evaluasi mutu beras di Provinsi Jawa Barat, Jawa Tengah dan Jawa Timur hasil panen musim kemarau 2007/*** Nugraha, S. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Buletin Teknologi Pascapanen Pertanian* (Indonesia) ISSN 1858-3504 (2009) v. 5(1) p. 56-60, 3 tables; 11 ref.

RICE; EVALUATION; QUALITY; DRY SEASON; MOISTURE CONTENT; MILLING.

West Java, Central Java, and East Java are the largest paddy producing areas in Java. However, the rice quality does not meet standard requirement. Therefore, essential improvement of postharvest handling is urgently required. The objectives of this research were to identify the yield quality of rice produced by local rice milling unit. This would provide quality distribution information for developing quality improvement programe and postharvest handling. Research was conducted using survey methods with stratified random sampling. Four districts were chosen from each province and 5 subdistricts were taken from each district in dry season 2007. Samples (500/g) were taken from 5 subdistricts (5 different RMU each). Parameters measured were milling degree, percentage of head rice, broken and brewers. Results showed that rice product in West Java had milling degree of 80-90%, head rice of 68.12-84.45%, broken rice of 13.80-31.67% and brewer 0.21-1.75%. Rice produced in Central Java had milling degre of 80-90%, head rice of 63.96-79.56% of broken rice of 19.06-35.80%, and brewers of 0.24-1.28%. Rice produced from East Java Province, has 80-90% milling degree, 58.43-76.91% head rice, 21.84-41.06% broken rice and 0.51-1.25% brewers. This indicated that rice produced by farmers did not meet quality. Enhancement of rice quality can be started by improving the postharvest handling in the field.

228 SETYONO, A.

Evaluation of rice quality in major rice producer areas in Java and Bali [Indonesia]. ***Evaluasi mutu beras di beberapa wilayah sentra produksi padi***/ Setyono, A.; Kusbiantoro, B.; Jumali; Wibowo, P.; Guswara, A. (Balai Besar Penelitian Tanaman Padi, Sukamandi

(Indonesia)). [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.) Sukamandi: BB Padi, 2009: p. 1429-1448, 5 ill., 1 table; 11 ref. 633.18-115.2/SEM/i bk4

RICE; MILLING; RETAIL MARKETING; MARKETS; QUALITY; STANDARDIZING; PRICES; CONSUMER BEHAVIOUR; PRODUCTION LOCATION.

The research consisting of survey on rice milling and milled rice trader, followed by grain quality analysis in laboratory, were done in West Java (5 districts), Central Java (5 districts), Yogyakarta Special Region (2 districts), East Java (5 districts), and Bali (3 districts). In each districts 15-20 respondents of rice milling unit and 15-20 respondents of rice trader were selected. Total respondents of RMU and rice traders were 332 and 334, respectively. Results of the survey showed that generally the RMU were 11-20 years old, some were even more than 20 years old. The respondents of RMU experienced of more than 10 years. The manager of RMU obtained the rice grain from the farmers. Most of the RMU dried the rice grain in the sun, with the thickness of the rice layer of about 3 cm. Two types of RMU observed during the survey were single and double phase types. Most single phase types of RMU were found in Bangkalan and Yogyakarta. The rice varieties common milled were IR64, Ciherang, Way Apo Buru, Muncul, Memberamo, Sintanur, IR-42, and Lusi. Results of the analysis of the dehulled rice sampled from RMU and rice traders showed that rice quality of the milled rice were low. This low quality was might be due to the improper handling of the grain prior to milling process, which further causing broken rice of >25%.

229 SUTRISNO

Effect of the grain size on milling rice recovery and head rice content. ***Pengaruh ukuran dan bentuk gabah terhadap rendemen dan mutu beras giling***/ Sutrisno; Achmad, D.R. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.). Sukamandi: BB Padi, 2009: p.1505-1516, 5 ill., 10 tables; 7 ref. 633.18-115.2/SEM/i bk4

RICE; SEED SIZE; RICE HUSKS; DRYING; DRYERS; MILLING; QUALITY; SEED MOISTURE CONTENT.

Research on the effects of the grain size on the milling rice recovery and head rice content was done in 2007. The rice grain of Pandan Wangi and IR-77 varieties were used representing the short and long grains, respectively. The wet paddies were dried through the drying machine and the sun drying. The average optimal moisture content of the machine-dried grains was 13.03% and by those sundried was 12.80%. These dried paddies were then milled in the commercial miller. The results showed that the average of the milled rice recovered from Pandan Wangi machine and sun-dried grains were 63.86% and 62.60%, respectively. While those recovered from the IR-77 were 63.54% and 62.57%, respectively. The observation on the quality aspect (percent of head rice content) showed that those of the Pandan Wangi machine and sun-dried methods were 85.90% and 83.97%, respectively, while those of IR-77 paddies were 81.91% and 75.69%, respectively.

L01 ANIMAL HUSBANDRY

230 HADIANA, M.H.

Impact of external location factors on smallholders dairying efficiency (an analysis base on cost frontier function). ***Dampak faktor eksternal kawasan terhadap efisiensi usaha ternak sapi perah (analisis berdasarkan fungsi biaya frontier)/*** Hadiana, M.H. (Universitas Padjadjaran, Bandung (Indonesia)). *Jurnal Ilmu Ternak* (Indonesia) ISSN 1410-5659 (2007) v. 7(1) p. 32-38, 1 ill., 2 tables; 14 ref.

DAIRY CATTLE; ANIMAL HUSBANDRY; ECONOMIC ANALYSIS; EFFICIENCY; ENVIRONMENTAL FACTORS

Two main issues are presented in this study, each are how was the variation of their dairying efficiency measured by frontier cost efficiency, the second, what external factors which affects the variation of the efficiency, furthermore what was their implications to regional policy in developing this sector. There were 246 smallholder dairying had been observed, spreading over eight subdistricts that were covered by five services areas of dairy cooperatives in Bandung District. The relation between exogenous variables and cost of milk production (endogenous variables) was described by an integrated regression models consisting of cost frontier function and inefficiency effect model. Estimation of coefficient of the regression used maximum likelihood estimation (MLE) method. The data was analyzed with Frontier 4.1 computer program (Coelli, 1996b). The results indicated a sizeable variation of the efficiency index in smallholder dairying, ranged from 0.15 to 0.94 (efficiency measurement based on frontier analysis spread from zero to one). This variation was caused by the impact of some external factor simultaneously (R^2=91%). It was indicated that there were some opportunities for the dairying more efficient by influence some instruments variables that related to the identified model. The results implied that the dairying tends to scatter around upland region which provides sufficient roughages, but the location should be accessible to be reached by cooperatives services. Making smallholder dairying more efficient should be supported by input policy and zoning regulations.

231 MAERTENS, L.

Milk production in rabbits: quantity and quality. ***Produksi susu pada kelinci: jumlah dan kualitas***/ Maertens, L. (Institute for Agricultural and Fisheries Research, Animal Sciences Unit Scheldeweg, Melle (Belgium)). Proceedings international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.). Bogor (Indonesia): ICARD, 2008: p. 101-115, 3 ill., 4 tables; 2 ref. 636.92.002/INT/p

RABBITS; HYBRIDS; ANIMAL HUSBANDRY METHODS; LACTATION; SUCKLING; MILK PRODUCTION; OLEIC ACID; LINOLEIC ACID; MILK YIELD.

Rabbit kits are until 18-19 days of age exclusively depending from the milk of their mother. Therefore early liveability and growth performances are closely related to the quantity and quality of the milk ingested. This review focuses on the milk yield and milk composition of rabbit does and the main influencing factors. There are different ways to quantify the milk yield of rabbits. Although possible, mechanical or manual milking is not a usual and practical method to measure milk production. An accurate indirect method is to weigh the female before and after the once a day nursing event. However, also the weight gain of the litter between birth and the age of 3 weeks is a very good estimate ($r \geq 0.9$) of the milk yield

during that period. Actual highly efficient hybrid does have, under favourable housing and feeding conditions, an average daily milk yield of 250 g or 60 g/kg of live weight during the 4-weeks lactation period. Native breeds under less favourable conditions have a milk yield of 100-150 g/day or 30-40 g/kg live weight. However, compared with cow and sow milk, rabbit's milk is much more concentrated in fat (12.9 g/100 g), protein (12.3 g/100 g) and energy (8.4 MJ/kg) which explains the extremely rapid growth of the young (weight x 6 after 3 weeks). Characteristic of rabbit milk is also the nearly absence of lactose (< 2 g/100 g). At peak lactation, protein output per kg metabolic weight (13.4 g/day/kg$^{0.75}$) exceeds even those of Holstein milk cows. The nonnutritional factors having the largest impact on the milk yield are the number of suckling kits, the parity order (primiparous vs multiparous), the breed and the gestation overlapping degree (rapid decline after 17-20 days of gestation). However, also through the reduction of feed intake, heat stress has a detrimental impact especially when the night temperature remains above 25°C. Rabbit milk lipids are highly saturated (70.4% SFA) due to the high content of C8:0 - C12:0 (50% of total FA) and further characterised by nearly equal quantities of oleic and linoleic acid and omega-6/omega-3 ratio around 4. Finally some data about the milk proteins including the immunoglobulins are presented.

L02 ANIMAL FEEDING

232 BINTANG, I A.K.

Supplementation of *Morinda citrifolia* waste as bioactive compound on the performances of broiler. *Penambahan ampas mengkudu sebagai senyawa bioaktif terhadap performans ayam broiler*/ Bintang, I A.K.; Sinurat, A.P.; Purwadaria, T. (Balai Penelitian Ternak, Bogor (Indonesia)). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2007) v. 12(1) p. 1-5, 2 tables; 29 ref.

BROILER CHICKENS; FEEDS; DRUG PLANTS; AGRICULTURAL WASTES; FEED ADDITIVES; ANIMAL PERFORMANCE.

A study on the use of dried *Morinda citrifolia* waste as feed additive in broiler ration was conducted. One hundred day old chicks (doc) were allocated into 4 levels (control; 0.0; 1.2; 2.4 and 4.8 g/kg feed) of *M. citrifolia* waste with 5 replications. Each replication had 5 birds. The treatments were allocated in a completely randomized design. Variables measured were feed intake, live weight, feed conversion ratio (FCR), percentages of carcass and internal organs (liver, gizard, abdominal fat, and thickness of intestine). The results showed that *M. citrifolia* waste supply did not significantly (P>0.05) affect all variables measured, but feed intake of those fed with high levels (4.8 g/kg) of *M. citrifolia* waste was significantly (P<0.05) lower than those fed with 1.2 g/kg. FCR was significantly (P<0.05) lower as compared to the control; 1.2 and 2.4 g/kg. It is concluded that the best treatment was the supplementation of *M. citrifolia* waste of 4.8 g/kg, this treatment improved feed efficiency by 5% as compared to the control.

233 EIBEN, C.S.

Effect of sunflower oil and linseed oil and vitamin E dietary supplementation on growing and slaughter performance of rabbits: preliminary publication. *Efek minyak bunga matahari dan minyak linseed dan suplementasi vitamin E terhadap performan pertumbuhan dan karkas kelinci*/ Eiben, C.S.; Godor-Surmann, K.; Vegi, B.; Virag, G.Y. (Research Institute for Animal Breeding and Nutrition, Godollo Isaszegi (Hungary)); Febel, H.; Zsedely, E.; Toth, T.; Schmidt, J. Proceedings of the international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.;

Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.). Bogor (Indonesia): ICARD, 2008: p. 93-100, 4 tables; 21 ref. 636.92.002/INT/p

RABBITS; SUNFLOWER OIL; LINSEED OIL; SUPPLEMENTS; VITAMIN E; FEED INTAKE; GROWTH; CARCASS COMPOSITION.

As part of a trial on improving the fatty acid profile and oxidative stability of rabbit meat, this work studied the effects of source and level of vitamin E dietary supplementation on growth and carcass traits in NZW rabbits (n = 300). The negative control group (NC) was fed a low energy diet (10.6 MJ/kg DE) without oil addition and with 60 mg/kg synthetic vitamin E (dl-alpha-tocopherol-acetate) from 21 to 84 days of age. The positive control group (PC) received a higher energy diet (11.4 MJ/kg DE) with 2% sunflower oil and 2% linseed oil and 60 mg/kg synthetic vitamin E. In 150-E5 and 300-ES groups the levels of synthetic vitamin E were increased to 150 and 300 mg/kg feed, respectively. In 90-EN and 240-EN groups 60 mg/kg synthetic plus 90 and 240 mg/kg natural vitamin E (a fatty acid distillate, i.e. d-alpa-tocopherol) were used to reach the 150 and 300 mg/kg vitamin E doses, respectively. Except in the NC group, the energy and oil contents of the diets were similar. Compared to NC rabbits, the 35 d body weight was the same for 150-ES young, but it was lower for the PC, 300-ES and 90-EN rabbits. The 240-EN kits had the lowest 35 d weaning weight which significantly differed from NC and 150-ES rabbits (914, 886, 892, 887, 883, 863 g, P = 0.011 for the NC, PC, 150-ES, 300-ES, 90-EN, 240-EN groups, respectively). At 84 days of age, however, the 300-ES and 240-EN rabbits had identical and higher body weights than NC rabbits. The 84 d live weights of PC, 150-ES and 90EN rabbits did not differ significantly from the other groups (2594, 2655, 2688, 2745, 2687, 2733 g, respectively P = 0.049). Compared to NC rabbits, feed conversion was significantly better for the other rabbits (3.29, 3.12, 3.03, 3.05, 3.05, 3.02, respectively P = 0.001). Dressing out percentages (63.1, 64.9, 64.4, 63.4, 63.1, 63.7, respectively, P = 0.001) were significantly higher for PC and 150-ES than for NC, 300-ES and 90-EN rabbits. The value for 240-EN rabbits was moderate and significantly differed only from PC rabbits. Based on these results also mg/kg synthetic vitamin E dietary addition is recommended. The inclusion of a higher dose with a partly natural source, i.e. 240 mg/kg natural vitamin E is also possible, if it significantly enhances the vitamin E content and the oxidative stability of the meat.

234 FIRSONI

Effect of feed supplements multinutrient (FSM) administration on sheep daily weight gain *in vivo*. *Pengaruh pemberian suplemen pakan multinutrien (SPM) terhadap pertambahan bobot badan domba secara in vivo*/ Firsoni; Wahidin T.S.; Suharyono (Pusat Aplikasi Teknologi Isotop dan Radiasi, Jakarta (Indonesia)). [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 245-248, 2 tables; 8 ref. 621.039.8/SIM/p

SHEEP; SUPPLEMENTS; NUTRIENT IMPROVEMENT; PROXIMATE COMPOSITION; CONCENTRATES; DIGESTIBILITY; WEIGHT GAIN; RUMEN MICROORGANISMS.

The basalt diet and concentrate are used as ruminants feed, but these are still not enough yet to fulfill animal nutrients needs. Some of farmers have been using feed supplements beside roughage and concentrate. Some of feed supplements could be bought from stores in

Indonesia. Feed supplements need to fulfill nutrient of ruminants feed, such as protein and energy source to be used by rumen microbes. The treatments are: A= roughage (*ad libitum*) + concentrate 125 g, B= A + feed supplement multinutrient (FSM) 25 g and C= A + 50 g FSM. The results showed that feed supplement multinutrient could increase daily weight gain of sheep 18.5 g/h/d (P>0.05), dry matter and organic digestibility from 55.65 - 62.32% (P>0.05) and 59.17 - 66.29% (P<0.05), and also improve feed consumption (dry matter and organic) from 0.89 - 0.95 kg and 0.81 - 0.86 kg.

235 ISKANDAR, T.

Comparison of liver coccidiosis therapy in rabbit (*Oryctolagus cuniculus*) using toltrazuril and cygro in drinking water and feed on the form of capsule. *Perbandingan terapi koksidiosis hati pada kelinci (Oryctolagus cuniculus) menggunakan toltrazuril dan cygro dalam air minum dan pakan dalam bentuk kapsul*/ Iskandar, T. (Balai Penelitian Veteriner, Bogor (Indonesia)). Proceedings of the international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.) Bogor (Indonesia): ICARD, 2008: p. 230-235, 1 ill., 1 table; 16 ref. 636.92.002/INT/p

RABBITS; COCCIDIOSIS; LIVER; DIET TREATMENT; FEEDS; DRINKING WATER; GELATIN; ANTICOCCIDIALS.

There were 6 groups of 15 New Zealand White (NZW) rabbits age 6 weeks that free from coccidian. Group I has got 5 ppm of cygro coccidiostat that was mixed in their diet, while group II has got 5 mg/kg body weight of cygro within gelatin capsules, which were given per os every 5 days. Group III were given 25 ppm of toltrazuril coccidiostat in the drinking water, while 20 mg/kg body weight packed within gelatin capsules were given per os to group IV which were being inoculated per os every 5 days. These coccidiostats were given continuously until the end of the experiment, while challenge was applied three days after the coccidiostat treatment. Group V was used as a control group with challenge, while group VI as a control group without challenge. The result of the experiment indicated that coccidiostats which were packed within gelatin capsules, then given per os to rabbits were more effective than if they were mixed directly with feed or drinking water, because after they were being challenged the mortality rate was smaller or zero, the growth average by body weight was normal. Oocyst production was very small and the lesion score of the liver only showed the presence of coccidiasis.

236 JUANDA, W.

Effect of castor meal (*Ricinus communis*) level in ration on quantity of raw leather of the New Zealand white grades. *Pengaruh pemberian bungkil biji jarak (Ricinus communis) dalam ransum terhadap kuantitas kulit segar kelinci peranakan New Zealand white*/ Juanda, W. (Universitas Padjajdaran, Bandung (Indonesia). Fakultas Peternakan). *Jurnal Ilmu Ternak* (Indonesia) ISSN 1410-5659 (2007) v. 7(1) p. 78-80, 3 tables; 5 ref.

RABBITS; FEEDS; RATIONS; CASTOR BEANS; OILSEED CAKES; FEED MEALS; FEED INTAKE; FURS; PRODUCTION.

The purpose of this study was to know the quantity of raw leather of the New Zealand White grades. The research was arranged in completely randomized design, with four treatments of castor meal, i.e the 0%, 2.5%, 5.0% and 7.5%, and each as replicated 6 times. Parameters

observed and analysed were weight, thick and width. The result of the experiment showed that the castor meal in ration until 5% did not affect quantity of raw leather of the New Zealand White grades.

237 KUSNADI, E.

Effect of antanan (*Centella asiatica*) administration as anti heat-stress agents in broilers diet containing hydrolized feather meal. *Pengaruh pemberian antanan (Centella asiatica) sebagai penangkal cekaman panas dalam ransum broiler yang mengandung hidrolisat bulu ayam/* Kusnadi, E. (Universitas Andalas, Padang (Indonesia). Fakultas Peternakan). *Jurnal Ilmu Ternak* (Indonesia) ISSN 1410-5659 (2007) v. 7(1) p. 58-63, 2 tables; 35 ref.

BROILER CHICKENS; FEEDS; PROXIMATE COMPOSITION; INGREDIENTS; FEATHER MEAL; DRUG PLANTS; ANALGESICS

This experiment was conducted to study the effect of antanan (*Centella asiatica*) administration as antiheat-stress agents in broilers diet containing hydrolized feather meal. The research used 81 broilers of 10 days old. The treatment consisted of two kinds. The treatment 1 was three levels of antanan (0.5 and 10% of rations). The treatment 2 was three levels of feather meal (0%, 4.8% and 9.6% of rations). The result indicated that 5% antanan tend to increase feed consumption and body weight gain and 4.8% feather meal did not decrease feed consumption and body weight gain. The administration of antanan and feather meal decreased the content of abdominal lipid and intestine.

238 MAERTENS, L.

Feeding strategies to reduce enteritis problem in relation to small and medium scale rabbit industry. *Strategi pemberian pakan untuk mengurangi enteritis pada industri peternakan kelinci skala kecil dan menengah/* Maertens, L. (Institute for Agricultural and Fisheries, Scheldeweg (Belgium)). Proceedings of the international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.). Bogor (Indonesia): ICARD, 2008: p. 23-30, 1 ill., 1 table; 9 ref. 636.92.002/INT/p

RABBITS; FEEDING SYSTEMS; ANTICOCCIDIALS; ENTERITIS; DIGESTIVE SYSTEM DISEASES; DIGESTIBLE FIBRE; DISEASE CONTROL; SMALL FARMS; ANIMAL HUSBANDRY.

Rabbits are known as fertile animals, however also as sensitive for enteritis problems leading to the main cause of mortality in growing rabbits. Beside hygienic strategies, including all-in and all-out measures, different feeding strategies have proved to be helpful to control these problems. An adequate coccidiosis prevention program, e.g. in-feed-anticoccidials, is necessary both in small and large scale rabbit production. Quite recently the role of low-digested and digestible fibre has been clarified in rabbit feeding for digestive troubles prevention. As a monogastric herbivorous animal, its digestive physiology is well adapted to high intake of plant cell walls. Apart from the important role of fibre intake, the favourable role of sufficient dietary low digestive fibre (mainly lignin and cellulose) on rabbit digestive health has clearly been shown. However, a good dietary balance with more digestible fibre classes such as hemicelluloses and pectins is also favourable to reduce enteritis problems. In weanlings, excessive dietary protein content also reduces digestive health especially when it replaces fibre in the diet. Moreover, some protein sources contain antinutritive factors, such

as lectins, antitrypsic or antigenic factors which could impair the digestion or induce changes in the morphology of intestinal mucosa leading to increased mortality. Another strategy which proved to be efficient even under infection pressure is a reduction of the feed intake level between 4 and 7 weeks of age. However, a reduction of 30% of the ad-libitum intake is necessary followed by a progressively increase of the feed intake level after the 3 weeks restriction period. Although some antibiotics have shown their efficacy in digestive trouble prevention, their use has been viewed critically because of their impact on the development of resistant bacteria that compromise human health. Alternatives are increasingly searched and used to disease control. Some of the candidate replacements for antibiotics such as probiotics, prebiotics, organic acids, plant extracts, enzymes and immune modulators have shown to have some potential in rabbit digestive trouble prevention.

239 PRAWIRODIGDO, S.

Apparent faecal digestibility of nitrogen of rabbits feed diets containing kapok-seed meal (*Ceiba pentandra* Gaertner). ***Daya cerna semu nitrogen pada ternak kelinci yang diberi pakan mengandung bungkil biji kapok (Ceiba pentandra Gaertner)/*** Prawirodigdo, S. (Balai Pengkajian Teknologi Pertanian Jawa Tengah, Ungaran (Indonesia)); Usman; Sukamto, B. Proceedings of the international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.). Bogor (Indonesia): ICARD, 2008: p. 185-191, 3 tables; 18 ref. 636.92.002/INT/p

RABBITS; FEEDS; OILSEED CAKES; KAPOK; DIGESTIBLE NITROGEN; PROXIMATE COMPOSITION; DIGESTIBILITY.

An experiment was performed to determine the apparent faecal digestibility of nitrogen (AFDN) of rabbits given diets containing kapok seed meal (KSM). The present study used 24 male New Zealand White rabbits of 12 weeks old (1,416 g initial live weight). The experimental animals were penned randomly in the individual wire-mesh cages, and allotted into four experimental diets. Thus, each rabbit received either one of the free KSM (Diet1), 5% KSM (Diet2), 10% KSM (Diet3), or 15% KSM (Diet4). The experimental diets were offered *ad libitum* to the rabbits in pellet form. Measurements were made for apparent faecal digestibility of dry matter (AFDDM), AFDN, crude fibre (AFDCF), and energy (AFDE). Results showed that there was no significant different between AFDN of rabbit consumed Diet1 and Diet2 (76% and 75%, respectively). However, AFDN of the Diet3 (72%) and Diet4 (72%) were lower ($P<0.05$) than in either the Diet1 or Diet2. It was possible that inclusion of 10% KSM in the diet already exhibited the deleterious effect of the cyclopropenoid fatty acid of such feedstuff. Consequently, inclusion of 15% KSM in the diet also rendered nitrogen digestibility in rabbits. Furthermore, the present experiment determined similar AFDDM (55.7-60%), AFDCF (14.2-15.3%), and AFDE (57.2-61.8%) among the four experimental diets. Overall, inclusion of 5% KSM in the diet for rabbit was obviously saved.

240 RAKHMANI, S.I.W.

Fermentation product of cassava waste for rabbit feed. ***Fermentasi onggok dan penggunaannya pada pakan kelinci/*** Rakhmani, S.I.W.; Rahardjo, Y.C. (Balai Penelitian Ternak, Bogor (Indonesia)). Proceedings of the international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah,

E. (eds.). Bogor (Indonesia): ICARD, 2008: p. 150-157, 3 ill., 5 tables; 8 ref. 636.92.002/INT/p

RABBITS; FEEDS; CASSAVA; WASTES; FERMENTED PRODUCTS; ASPERGILLUS NIGER; ENZYME ACTIVITY; PROXIMATE COMPOSITION; ANIMAL PERFORMANCE.

Cassava waste product (CWP) is abundantly available in Indonesia and become problem for environment. It should be potential for animal feed, however its nutritive value especially the protein content is low (below 1%). Enhancement of protein content can be done through fermentation of cassava waste using *Aspergillus niger*. Furthermore, enzymes (cellulose and amylase) in the fermentation product could be useful to increase feed digestibility. Enzymes activity were 25.02 ± 5.43 and 123.22 ± 4.12 U/gram DM product for cellulase (CMC-ase) and amylase respectively. Inclusion of fermented product up to 10 and 20% in rabbit basal diet increased the live body weight (12 weeks) (1951 and 1900 g) when compared to control (1,468 g). Fermented product of cassava waste can be used for protein source in rabbit diet.

241 SAEFULHADJAR, D.

Influence of palm kernel cake level in the diet on digestibility of dry matter, organic matter and crude protein in rabbit/ Saefulhadjar, D.; Aisjah, T. (Universitas Padjadjaran, Bandung (Indonesia)); Suhendri. Proceedings of the international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.). Bogor (Indonesia): ICARD, 2008; p. 177-179, 3 tables; 6 ref. 636.92.002/INT/p

RABBITS; RATIONS; FEED ADDITIVES; OILSEED CAKES; PALM KERNELS; DIGESTIBILITY; ORGANIC MATTER; CRUDE PROTEIN; DRY MATTER CONTENT.

A study was conducted to evaluate the effect of adding levels of palm kernel cake to the diet on dry and organic matter and crude protein digestibility in the rabbit. Palm kernel cake was used in iso-caloric and isoprotein diets at levels of 0, 10, 20 and 30% and fed from 1-17 days. This study used a completely randomized design and for statistical analysis used analysis of variance to know the influence of treatment, for testing once and other treatment used Duncan Multiple Range Test. The research used Collecting Feces Method with 6 replications. The results showed that adding levels of palm kernel cake did not significantly affect dry and organic matter and crude protein digestibility. The use of palm kernel cake until 30% in the diet had similar effect with the diet without adding palm kernel cake and had beneficial effect on digestibility.

242 SASONGKO, W.T.

Effect of UMMB supplementation in corn stover on the buffalo rumen microbes fermentation. ***Pengaruh penambahan UMMB pada jerami jagung terhadap kinerja fermentasi mikroba rumen kerbau***/ Sasongko, W.T.; Andini, L.; Kurniawati, A.; Suharyono (Pusat Aplikasi Teknologi Isotop dan Radiasi, Jakarta (Indonesia)). [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 241-244, 3 tables; 8 ref. 621.039.8/SIM/p

WATER BUFFALOES; COMPLETE FEEDS; SUPPLEMENTS; STRAW; MAIZE; RUMEN DIGESTION; RUMEN MICROORGANISMS; IN VITRO.

The objective of this research was to examine the effect of UMMB supplementation in complete feed formulation on rumen fermentation parameters. *In vitro* gas production technique has been used. The composition of five complete feed rations consisted of UMMB and corn straw based on the dry matters. The formulas were: 0%:100% (A); 2,5%:97,5% (B); 5%:95% (C); 10%:90% (D) and 20%:80% (E). The research was conducted in Animal Nutrition Laboratory, Center for Applications of Isotopes and Radiation-National Nuclear Agency. The data were analysed using completely randomized design. The parameter observed were gas production during 24 hours, pH, VFA, NH3, dry matter and organic matter. The result showed that all formulas have no significant effect to all of the parameters.

243 SUGITO

Histopathology of liver and kidney on broiler chicken exposed to heat stress and fed extract of jaloh (*Salix tetrasperma* Roxb). *Histopatologi hati dan ginjal pada ayam broiler yang dipapar cekaman panas dan diberi ekstrak kulit batang jaloh (Salix tetrasperma Roxb)*/ Sugito; Manalu, W. (Universitas Syiah Kuala, Banda Aceh (Indonesia). Fakultas Kedokteran Hewan); Astuti, D.A.; Handaryani, E.; Chairul. *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2007) v. 12(1) p. 68-73, 2 ill., 1 table; 20 ref.

BROILER CHICKENS; DRUG PLANTS; FEED ADDITIVES; HEAT STRESS; ANTIPYRETICS; LIVER; KIDNEYS; HISTOPATHOLOGY.

This research was conducted to study the effects of jaloh extract (*Salix tetrasperma* Roxb.) on broiler chicken exposed to heat stress in constant temperature of 33 ± 1°C for 4 hours per day for 10 days. Fifteen chickens aged 20 days old (strain Cobb) were divided randomly into 5 groups. The first group was external control (tCP) of the chickens received neither heat stress nor jaloh extract. The second group was internal control (CP) representing chickens given heat stress without jaloh extract. The third, fourth, and fifth groups consisted of chickens given heat stress and 10 mg/kg body weight of hexane (CP + Hek), ethyl acetate (CP + EtOAc), and ethanol (CP + EtOH) fractions, respectively. Heat stress and jaloh extract were given every day. Extract of jaloh were given 1 hour before temperature in the cage was raised. On l0th day of the experiment, 3 chickens were killed and necropted. Liver and kidney tissues from each treatment were analyzed for histological condition. The results indicated that heat stress can induce injury degeneration, necrosis, and infiltration of inflammation cells of liver and kidney. It is concluded that the hexane fraction of jaloh extract could protect the detrimental effects on heat stress.

244 SUGORO, I.

Effect of molasses concentration in air-lift fermentor 18 liter on the biomass production of R1 and R2 yeast isolates. *Pengaruh konsentrasi molases dalam fermentor air lift skala 18 liter terhadap produksi biomassa isolat khamir R1 dan R2*/ Sugoro, I. (Pusat Aplikasi Teknologi Isotop dan Radiasi, Jakarta (Indonesia)); Pikoli, M.R. [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 285-290, 6 ill., 1 table; 10 ref 621.039.8/SIM/p

RUMINANTS; PROBIOTICS; YEASTS; MOLASSES; FERMENTERS; BIOMASS; GLUCOSE; SWEET POTATOES; EXTRACTS.

By using P-32 tracer, R1 and R2 yeast isolates have been selected as probiotic of ruminants. To produce the biomass of these yeast isolates, the extract of sweet potatoes can be used as growth medium with addition of small amount of molasses as co-substrate. The objective of this experiment is to determine the effect of molasses concentration on the biomass production in air lift fermentor with scale of 18 l. The molasses concentrations were 0%, 5% and 10%. The result showed that the addition of 1% molasses in fermentor increased biomass production of R2 yeast isolate, but the biomass production of R1 yeast isolate was not affected by addition of molasses in fermentor.

245 SUHARYONO

Effect of feed supplements on bali bulls weight gain at Tukadaya, Bali (Indonesia). ***Pengaruh suplemen pakan terhadap pertambahan bobot badan sapi bali di Desa Tukadaya Bali*****/** Suharyono; Firsoni (Pusat Aplikasi Teknologi Isotop dan Radiasi, Jakarta (Indonesia)). [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 235-239, 2 tables; 10 ref. 621.039.8/SIM/p

CATTLE; SUPPLEMENTS; PROXIMATE COMPOSITION; WEIGHT GAIN; BALI.

This research was done to observe the effects of feed supplements on bali bull weight gain. The feeds were forages, local concentrate, UMMB (urea molasses multinutrient block), SPMTM (feed supplement without molasses) and SPM (feed supplement molasses). The treatments were A= forages (ad libitum) + 500 g of concentrate (control), B= A + 400 g UMMB, C= A + 400 g SPMTM and D= A + 400 g SPM. Parameters observed were 90 days bali bull weight gain. The results showed that no significant effect (P>0.05) of feed supplements administration (treatment B, C and D) on bali bull weight gain. Treatment B described the highest weight gain of 56.40 kg and the lowest was treatment A (12.20 kg). The average bali bull weight gain per day on treatment B (0.627 kg/h/d) was higher than that on treatment A (0.136 kg/h/d).

246 TANGENDJAJA, B.

Feeding value of fresh and dried *Calliandra calothyrsus* for rabbits. ***Nilai gizi Calliandra calothyrsus segar dan layu untuk kelinci*****/** Tangendjaja, B.; Wina, E.; Susana, I W.R. (Balai Penelitian Ternak, Bogor (Indonesia)). Proceedings international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.). Bogor (Indonesia): ICARD, 2008: p. 140-145, 5 tables; 11 ref. 636.92.002/INT/p

RABBITS; CALLIANDRA CALOTHYRSUS; NUTRITIVE VALUE; FEEDS; LEAF MEAT; DESICCATED FODDERS; CRUDE FIBRE; DIGESTIBILITY; GROWTH RATE.

Calliandra calothyrsus is a leguminous tree widely grown in Indonesia and has protein content of 25% and can be valuable as rabbits feed. Two feeding trials have been conducted to evaluate different levels of fresh (0, 15, 30 and 45%) and dried (0, 15 and 30%) calliandra leaves for growing rabbits at the initial body weight of 730-860 g. The dietary treatments

were formulated to meet the nutrient requirement of growing rabbits and were fed to rabbits raised in the individual wire cage and replicated 8 times. Fresh calliandra leaves was readily consumed by rabbits. Rabbits fed fresh calliandra leaves grew at the rate of 15-19 g/day and there was no significant difference on the daily gain and feed/gain ration due to the treatments. Feeding of calliandra leaf meal up to 30% in the diet also did not affect the growth rate of rabbits with the average daily gain of 19-21 g/day. A digestibility trial has been conducted to measure the effect of wilting of calliandra leaf using neck-collared rabbits to prevent corpophagy raised in metabolism cages. Dry matter digestibility of fresh calliandra was 50% and was found no statistical difference to that of wilted calliandra (44.7%). There was a significant effect of wilting on neutral detergent fiber digestibility (NDF) and protein-bound NDF but not on total protein. NDF digestibility decreased from 24% in fresh leaves to 2.4% in wilted leaves. Prevention of coprophagy on rabbit resulted in decrease on dry matter, protein, fiber and protein-bound fiber. The digestibility of extractable tannin was almost totally disappeared in the faeces and caused the tannin digestibility measured by protein precipitation technique was very high. In conclusion, calliandra leaves both fresh and dried can be fed to rabbits up to 45% and 30%, respectively and the fiber component in calliandra is less digested when the leaves was wilted.

247 UHI, H.T.

Improvement of nutritive value of sago waste through biofermentation. *Peningkatan nilai nutrisi ampas sagu (Metroxylon sp.) melalui bio-fermentasi*/ Uhi, H.T. (Balai Pengkajian Teknologi Pertanian Papua Barat, Manokwari (Indonesia)). *Jurnal Ilmu Ternak* (Indonesia) ISSN 1410-5659 (2007) v. 7(1) p. 26-31, 2 ill., 2 tables; 10 ref.

SAGO; AGRICULTURAL WASTES; FEEDS; FEED MEALS; PROCESSING; FERMENTATION.

A research of sago waste bio-fermentation was aimed to increase the nutritional quality of sago waste by using probion. The treatments used were P1 (ihur sago waste 100 kg + Probion 100 g + urea 100 g); P2 (tuni sago waste 100 kg + Probion 100 g + urea 100 g); P3 (ihur sago waste 100 kg + Probion 200 g + urea 200 g); P4 (tuni sago waste 100 kg + Probion 200 g + urea 200 g); P5 (ihur sago waste 100 kg + Probion 300 g + urea 300 g); P6 (tuni sago waste 100 kg + Probion 300 g + urea 300 g). The parameters observed were pH media, temperature media, proximate analysis (raw protein, fiber, fat, metabolic energy and dry matters). The research results showed that the appropriate optimum fermentation process for sago waste media for 21 days with best treatment of 300 g probion and 300 g urea, produced 4.81 g raw protein, 5.49 g raw fiber, 0.73% fat, and 3,860 kcal metabolic energy. The highest fermentation temperature at the 15th day was P5 treatment and the lowest pH value at the end research was 4.2.

248 WAHYUNI, H.I.

Chemical metabolites profile of rabbits meat fed increasing dietary level of lysine. *Profil komponen kimia daging kelinci yang diberi ransum dengan lisin meningkat*/ Wahyuni, H.I.; Lestari, C.M.S.; Susandari, L.; Nasikhah, T.Z. (Universitas Diponegoro, Semarang (Indonesia). Fakultas Peternakan). Proceedings of the international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.). Bogor (Indonesia): ICARD, 2008: p. 210-214, 3 tables; 15 ref. 636.92.002/INT/p

RABBITS; RATIONS; LYSINE; PROXIMATE COMPOSITION; FEED INTAKE; METABOLISMS; FEEDING LEVEL; RABBIT MEAT; CHEMICAL COMPOSITION.

The research aimed to evaluate the effect of increasing lysine in rabbit's diet on meat's chemical profile. The meat's chemical compounds evaluated were concentration of cholesterol, fat, calcium, and protein mass. Twenty five heads of female rabbit with initial body weight of 1513.88 ± 99.35 gram were used in completely randomized designed (CRD) and fed on pellet diet containing of 18% protein and DE of 2,400 Kcal/kg. Dietary inclusions of synthetic L lysine-HCl were 0.60; 0.66; 0.72; 0.78, and 0.84%. Data were analyzed using analysis of variance continued to Duncan Multiple Range Test (DMRT). The result showed that feed, protein and calcium consumption, the content of meat's fat, calcium and protein mass were not significantly influenced by increasing dietary lysine level ($P > 0.05$). However, meat's calcium content was significantly influenced by dietary lysine level ($P \leq 0.05$). Meat's calcium of rabbit fed dietary lysine of 0.72 - 0.84% were higher as compared to those of rabbits fed diet of 0.60 - 0.66% lysine. Increasing dietary lysine up to 0.84% resulting dietary amino acid imbalance, but it did not influence the meat's metabolite profile, except calcium deposition increased almost 20%, when lysine was added to the diet at the minimal level of 0.72%.

249 YURMIATI, H.

Use of animal protein sources in the diet and their effect on the physical quality of rabbit pelt. ***Penggunaan sumber protein hewani dalam ransum kelinci terhadap kualitas fisik pelt***/ Yurmiati, H. (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Peternakan). Proceedings of the international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.). Bogor (Indonesia): ICARD, 2008: p.172-176, 1 table; 12 ref. 636.92.002/INT/p

RABBITS; RATIONS; PROTEIN QUALITY; ANIMAL PROTEIN; FISH MEAL; LUMBRICUS RUBELLUS; FURS; QUALITY.

Rabbit is a potential livestock which yields good pelts. Physical quality of of good pelt required usage of feeding stuff protein source in the diet, especially animal protein. Quality of source of animal protein extremely depends on applied material, at this research applied tuna waste (*Thunnus albacares*) and earthworm (*Lumbricus rubellus*). The purpose of this research was to know the influence and the use of various sources of animal proteins in the diet to physical quality of rabbit's pelt. This research was done in experimental by using 18 weaned male rabbits hybrid of New Zealand White. Research used completely randomized design, as treatment of 3 kinds of source protein: R0 (the diet which is not contained animal protein), R1 (the diet which is contained source of animal protein of tuna waste), and R2 (the diet which is contained animal protein of earth-worm meal) with each 6 times replication. The diet was compiled based on requirement of rabbit with rough protein content 17.07% and energy 2,805 kcal. The conclusion was that protein source in the diet has significantly influence the physical quality of rabbit's pelt, the highest physical quality showed by treatment of the diet containing animal protein source of earth-worm meal.

L10 ANIMAL GENETICS AND BREEDING

250 DUDI

Identification of quantitative traits of Cihateup ducks as local genetic resources. ***Identifikasi sifat kuantitatif itik Cihateup sebagai sumber daya genetik unggas lokal/*** Dudi (Universitas Padjadjaran, Bandung (Indonesia)). Fakultas Peternakan). *Jurnal Ilmu Ternak* (Indonesia) ISSN 1410-5659 (2007) v. 7(1) p. 39-42, 3 tables; 12 ref.

DUCKS; ANIMAL MORPHOLOGY; ANIMAL PERFORMANCE; BREEDS; ANIMALS; GENETIC RESOURCES; JAVA

The aim of this research was to obtain information on quantitative traits of Cihateup duck as local animal genetic resources in Cihateup District-West Java. Data were analysed using statistical descriptive method. The result indicated that egg weight, egg index, DOD weight, and nature weight were 69.34 ± 2.39 g; 81.30 ± 1.19% (norman category); 45.42 ± 2.40 g; and 2.7 ± 0.05 kg, respectively. The good selection was conducted by Cihateup duck farmers, therefore the purity of Cihateup duck as specific genetic resources of West Java province can be sustained.

251 NATAAMIJAYA, A.G.

[Characteristics and productivity of black kedu fowl]. ***Karakteristik dan produktivitas ayam kedu hitam***/ Nataamijaya, A.G. (Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia)). *Buletin Plasma Nutfah* (Indonesia) ISSN 1410-4377 (2008) v. 14(2) p. 85-89, 3 ill., 15 ref.

CHICKENS; GENETIC RESOURCES; PRODUCTIVITY; EGG PRODUCTION; ENERGY VALUE; JAVA.

The black kedu fowl, originating from Kedu District of Temanggung-Central Java is one of rare types of Indonesian local fowl and considered as productive egg layer amongst local fowls. Therefore, they need to be characterized to better utilize their potential to breed commercial stocks. This study was conducted to find out more reliable data on the characteristics and productivity of the fowl. Two hundred and forty day old chicks were raised in 20 brooders sized 1.5 m x 1.2 m x 0.75 m and fed starter diet contained 20% of crude protein and 3,100 kcal metabolizable energy/kg until 4 weeks old, thereafter the birds diet contained 18% crude protein and 3,000 kcal metabolizable energy/kg until 8 weeks old, then 14% crude protein and 2,800 kcal/kg until 20 weeks old and placed at grower house, after week 20 these hens were removed into layer house. At the age of 21 weeks these birds were given layer diet with 16% crude protein and 2,800 kcal metabolizable energy/kg of diet. Drinking water was given ad libitum. Results showed that the dominant plumage colour was shiny black either male or female with red comb and wattle, whilst the colour of shank and beak were mostly dark. The average mortality rate at 1st, 2nd and sixth week was 6.07, 2.16, and 0.43% respectively. The average body weight of chicks at day one was 28.98 g. At the 1st to 8th week the average body weight was 40.58, 81.25, 123.60, 192.68, 286.02, 380.39, 487.68, and 578.08 g with feed conversion value of 1.02, 2.58, 2.82, 2.91, 2.98, 3.23, 3.86, and 4.42. Some of the hens started laying eggs at 20 weeks old, however most of them started at 22 weeks old when the production rate was 14.9%. Peak production (41.70%) was reached at 38 weeks old, the average egg production during observation period was 32.48% with feed conversion value for egg production around 6.58. These eggs were laid in the morning (54.36%), the rest were laid in the afternoon (45.64%), the color of the eggs was light brown (75.48%) and brown (25.52%). The average weight of egg was 28.64 g at initial

laying period, 35.69 g at peak production and 43.33 g at 52 weeks old, the grade/USDA score of inner egg quality was A/4. It was concluded that the black kedu fowl has a distinctive appearance and better productivity compared to ordinary local fowl, and hence could be utilized as genetic resources to develop egg type commercial stock.

252 PRASETYO, S.

Growth of the Rex rabbit hair. ***Pertumbuhan bulu kelinci Rex/*** Prasetyo, S. (Universitas Mataram, Lombok (Indonesia). Fakultas Peternakan); Rahardjo, Y.C. Proceedings of the international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.). Bogor (Indonesia): ICARD, 2008: p. 163-171, 4 ill., 4 tables; 12 ref. 636.92.002/INT/p

RABBITS; CROSSBREEDING; HAIR; GROWTH; BIOLOGICAL DEVELOPMENT; DIAMETER; DENSITY; ANIMAL CUTICLE.

Forty Rex rabbits, 40 Satin rabbits, 40 Rex-Satin cross, and 40 Satin-Rex cross were used for studying the growth of the Rex rabbit hair at the Research Institute for Animal Production, Ciawi-Bogor. They were indoors in Quonset-style wire cages, were fed ad libitum commercial diet with 22% crude protein and 2,750 kcal. Hair samples were taken from all rabbits on a certain location that was the medio dorsalis of the vertebrae lumbalis. This study used two methods. The qualitative method was used to know the hair growth cycle and the hair growth pattern. The quantitative method was used to know the hair growth by measuring the hair length, diameter, density and weight of the Rex rabbits at the age of 4, 8, 12, 16, and 20 weeks. The hair samples were taken in those ages. The hair characteristics were the guard hair to down hair length ratio, the hair growth angle from the body surface and the hair softness. The guard hair diameter and the type of the hair cuticles dictated the hair softness. To know the Rex rabbit hair characteristic, the hair was compared with Satin rabbit hair and the crosses using one-way analysis of variance continued by Tukey test for comparing between two means. Observation started when rabbits were on one day of age. The hair started to grow on 3 days old. The hair growth was cyclical. The baby prime cycle occurred from birth and stopped in 10 weeks of age. The intermediate prime cycle started in 11 weeks of age and terminated in 20 weeks of age. The senior prime cycle started in 21 weeks of age. There was a certain pattern for the hair growth. Following the hair shedding, the new hairs appeared at the midpoint of the back and the belly. After that, the hair growth progressed to the side. There was no significant different in the maximum hair length in the baby intermediate and the senior prime cycle. In the intermediate prime cycle, the hair had already in the maximum length in the first second week (19.26 ± 2.46 mm for down hairs and 19.54 ± 2.33 mm for guard hairs). In any cycle, there was a tendency that at the beginning of a prime cycle the average hair diameter was larger than that of the latter. The guard and the down hair density increased within the baby or the intermediate prime cycle. The hairs, down and guard hair, were more dense in the intermediate prime cycle than in the baby prime cycle. In the baby prime cycle, the down and the guard hair grew proportionally. In the intermediate prime cycle, however, the guard hairs tend to grow more than the down hairs. In any cycle, the hair weight per cm^2 increased as the hair density increased. The average hair weight per piece, however, decreased as the hair density increased. The guard to down hair length ratio was 1:1. The Rex rabbit's guard hair diameter was absolutely smaller than that of the non-Rex rabbits. The type of the Rex rabbit's hair cuticles was wave type, which supported the hair softness.

253 RAHARDJO, Y.C.

Possibility of creating shiny fine hair rabbit. *Kemungkinan pembentukan kelinci berbulu halus dan kilap/* Rahardjo, Y.C. (Balai Penelitian Ternak, Bogor (Indonesia)); Prasetyo, S. Proceedings of the international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.). Bogor (Indonesia): ICARD, 2008: p.158-162, 3 ill., 3 tables; 12 ref. 636.92.002/INT/p

RABBITS; CROSSBREEDING; COMBINING ABILITY; HAIR; F2 HYBRIDS; DIAMETER; BIOLOGICAL PROPERTIES.

The aim of this study was to know the possibility of creating shiny fine hair rabbit by combining fine hair trait from Rex Rabbit (H) and shiny hair trait from Satin rabbit (K). The material used was F2, the offspring of the crossed of the Rex Rabbit male and the Satin Rabbit female (FIHK) as well as the offspring the reciprocal (F1KH) which mated interse became F2HKHK and F2KHKH, and the crossed became F2HKKH and F2KHHK. Qualitative and quantitative approaches were adopted in this study. To know that the shiny and the fine hair traits could be combined, all of the F2 (425 heads) which were four weeks old were observed. Each type of the F2 were grouped according to the hair condition by macroscopic observation (touching and looking at the hair) using a definite standard. If there were some rabbits having shiny-fine hair, for confirming the macroscopic observation, the hair samples of the shiny fine rabbits' hair were observed microscopically. For knowing that the Mendel Law worked in the F2, Chi square test was used. From the result of the experiment, it was concluded that rabbits having fine and shiny hair could be created in the second generation of crossing between Rex rabbits and Satin rabbits; Mendel law did not work in the F2.

254 SZENDRO, Z.S.

Effect of crossbreeding on reproductive performance in rabbits. *Pengaruh perkawinan silang terhadap tampilan reproduksi kelinci/* Szendro, Z.; Radnai, I.; Biro-Nemeth, E.; Princz, Z.; Matics, Z.; Gyoval, P.; Nagy, I. (University of Kaposvar, Guba (Hungary). Faculty of Animal Science); Kustos, K.; Juhasz, Z. Proceedings of the international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.). Bogor (Indonesia): ICARD, 2008: p. 131-135, 3 ill., 1 table; 14 ref. 636.92.002/INT/p

RABBITS; CROSSBREEDING; REPRODUCTIVE PERFORMANCE; GENOTYPES.

A crossbreeding experiment was carried out to evaluate the reproductive performance of purebred and crossbred rabbit does. Data of purebred Pannon White (PW, 195 litters), Maternal line (ML, 155 litters) and that of their diallel crossbred does (male ML x female PW, 166 litters, male PW + female ML, 173 litters) were compared. The conception rate of the four genotypes was similar (77.5-79.4%). The effect of genotype on body weight of does at parturition (PW: 4.30 kg, ML: 4.05 kg, MLPW: 4.16 kg, PWML: 4.16 kg, $P<0.001$) and on number of kits born alive (NBA) (PW: 7.88, ML: 8.19, MLPW: 8.38, PWML: 8.91, $P<0.05$) was significant. On the contrary differences in total number of kits born (TNB) were not significant (PW: 8.44, ML: 9.04. MLPW: 9.29, PWML: 9.61, $P = 0.125$). The size of the heterosis in TNB and NBA alive was 5.7 and 7.6%, respectively. After equalization of litter size for 8.03-8.33 in each genotype no heterosis was found in litter size and litter weight at 21 days of age. The best crossing combination was male PW x female ML.

L40 ANIMAL STRUCTURE

255 BRAHMANTIYO, B.
Evaluation of morphometric characteristic and estimation of mahalanobis genetic distance of rabbit from RIAP Bogor. ***Evaluasi karakteristik morfometrik dan pendugaan jarak genetik mahalanobis kelinci di Balai Penelitian Ternak***/ Brahmantiyo, B.; Martojo, H.; Mansjoer, S.S.; Rahardjo, Y.C. (Balai Penelitian Ternak, Bogor). Proceedings of the international conference on rabbit production, Bogor, 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.). Bogor (Indonesia): ICARD, 2008: p. 146-149, 1 ill., 3 tables; 5 ref. 636.92.002/INT/p

RABBITS; ANIMAL MORPHOLOGY; BODY CONFORMATION; GENETIC DISTANCE; BREEDING METHODS; STATISTICAL METHODS; RESEARCH INSTITUTIONS; JAVA.

The observation on morphological body conformation of New Zealand White (NZW), Rex (RR), Satin (SS) and Rex x Satin (RS) from RIAP-Ciawi, were carried out to determine estimation of mahalanobis genetic distance and discriminant analysis. The research was done at RIAP, Bogor, using 23 heads NZW, 25 heads RR, 22 heads of SS and 21 heads of RS rabbits. Length of head, width of head, length of ear, width of ear, circumference of chest, depth of chest, width of chest, length of scapula, length of humerus, length of radius-ulna, length of tibia, length of body and width of hip were measured to observe their body size. Data obtained were analyzed by using GLM (general linear models) and simple discriminant analysis with SAS package program version 6.12 (SAS, 1985) and program MEGA2 to make the construction of tree phenograms. NZW rabbits had larger body size (i.e. length of head, ear, radius-ulna, and tibia, and also width of hip) than RS rabbits. Mahalanobis genetic distance showed that NZW with RR, SS and RS had a genetic distance of 2.084159, 2.986475 and 3.747641, respectively. RR with SS and RS had a genetic distance of 2.584121 and 3.308619. SS and RS had a genetic distance of 2.785891. Results from canonical analysis showed that the most discriminant variables were obtained from length of radius-ulna, length of tibia and width of hip. Genetic distance and discriminant analysis conformed to the fact of NZW, Rex and Satin rabbits and development of Rex x Satin rabbit at RIAP that improvement of rabbits production were done by selection and crossing.

L50 ANIMAL PHYSIOLOGY AND BIOCHEMISTRY

256 WIYATNA, M.F.
Ratio of meat index of Indonesian cattles (bali, madura, PO) with Australian cattle (Australian commercial cross). ***Perbandingan indeks perdagingan sapi-sapi Indonesia (sapi bali, madura, PO) dengan sapi Australian Commercial Cross (ACC)/*** Wiyatna, M.F. (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Peternakan). *Jurnal Ilmu Ternak* (Indonesia) ISSN 1410-5659 (2007) v. 7(1) p. 22-25, 2 tables; 13 ref.

CATTLE; BEEF CATTLE; ANIMAL MORPHOLOGY; ANIMAL PERFORMANCE; MEAT; CARCASSES; CARCASS COMPOSITION

The research of the ratio of meat index of Indonesian cattle (Bali, Madura, PO) with Australian cattle has been done in Ciroyom Abbatoir Bandung. The research sampel used 25 heads of each breeds with moderate body size and 2.5 -3 years of age. This research aimed to find out the ratio of meat index among Indonesian and Australian cattle. This research used

causal comparative design. The variables measured were body weight, hot carcass weight, dressing percentage, carcass lenght and meat index. The data was analyzed by analysis of variance. Duncan test was used to know the differences between treatments. The results of this research showed that the highest meat index resulted from ACC was 1,415, then bali cattle 1,232, and PO 1,210. Bali cattle was as good as Australian cattle (ACC).

L51 ANIMAL PHYSIOLOGY - NUTRITION

257 ANDINI, L.

Effect of fermentation of mutant sorghum stover in digestibility by rumen microorganisms *in vitro*. *Pengaruh fermentasi pada kecernaan jerami sorgum mutan oleh mikroorganisme rumen secara in vitro* / Andini, L.; Kurniawati, A.; Sasongko, W.T. (Pusat Aplikasi Teknologi Isotop dan Radiasi, Jakarta (Indonesia)). [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 249-252, 4 tables; 8 ref. 621.039.8/SIM/p

RUMINANTS; SORGHUM; STRAW; FERMENTATION; STARTER CULTURES; DIGESTIBILITY; IN VITRO EXPERIMENTATION; RUMEN FLUID; RUMEN MICROORGANISMS.

In the dry season, usually there is scarcity of forage. Therefore, there is a need to find alternative basal feed for ruminants. Sorghum stover is one of the agricultural wastes which is used as a basal feed for ruminants. However, its digestibility by rumen microorganisms is still unknown. The aim of this research is to study fermentation effects in the improvement of rumen digestibility of sorghum stover. Research has been conducted to measure *in vitro* rumen digestibility using rumen fluid taken from fistulated buffalo and buffer media in syringe glass and incubated it at 39°C for 24 hours. Sorghum stover was fermented using urea with weight percentage of 0; 0.15; 0.30; and 0.45%, respectively. Probiotics were also used as a starter weight in percentage of 0; 0.25; 0.50 and 0.75%. The sorghum stover was cut into 3-5 cm length and mixed with urea and probiotic as basic concentration, and then incubated at an ambient temperature for 3 weeks. Analyzed parameters were gas production, dry matter digestibility (DMD), organic matter digestibility (OMD), and microbial mass production (MMP). The results showed volume gas production of 22.48 - 28.27 ml/200 mg BK, DMD of 35.08 - 47.16%; OMD of 96.47 - 98.33%; MMP of 10.72 - 14.12 mg. Fermented sorghum stover has a higher digestibility than its unfermented counterpart. The optimum concentration for gas production is 0% urea and 0.5% starter, for DMD is 0% urea and 0.75% starter, for OMD is 0.3% urea and 0.5% starter while for MMP is 0% urea and 0.75% starter.

258 GHOLIB, D.

Gastrointestinal disturbances in rabbits. *Gangguan pencernaan pada kelinci*/ Gholib, D. (Balai Penelitian Veteriner, Bogor (Indonesia)). Proceedings of the international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.) Bogor (Indonesia): ICARD, 2008: p. 236-241, 1 table; 11 ref. 636.92.002/INT/p

RABBITS; DIGESTIVE DISORDERS; BLOAT; MYCOTOXINS; POISONING; GASTROINTESTINAL MOTILITY; ENTERITIS.

The most disturbing conditions on rabbits are gastrointestinal (GI) problem. The conditions commonly produce diarrhea and constipation. Effect of slowdown activities of intestine motility make gas accumulation occurred, produced by process of digestion, and gas accumulation in stomach, intestines and cecum occurred, it makes abdomen distended (bloat). Gas pressure produces pain on the abdomen (colic). This occurrence make high mortality rate and acute. Frequency of occurrence on baby rabbits is high especially in weaning time (age 4-7 weeks), it results in an economic loss, either due to mortality or not reached body weight gain. Depend on factors that caused the evident, GI disturbances are divided into 5 kinds of disorders, such as GI stasis, GI obstruction, GI infection, mucoid enteropathies, and mycotoxicosis.

L52 ANIMAL PHYSIOLOGY – GROWTH AND DEVELOPMENT

259 KARNAEN

Growth curve model of female and male madura cattle on pre weaning period. ***Model kurva pertumbuhan pra sapih dari sapi madura betina dan jantan***/ Karnaen (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Peternakan). *Jurnal Ilmu Ternak* (Indonesia) ISSN 1410-5659 (2007) v. 7(1) p. 48-51, 1 ill., 2 tables; 8 ref.

BEEF CATTLE; WEANING PERIOD; GROWTH; FEMALES; MALES; ANIMAL PERFORMANCE

Curve growth represents mirroring of capabillity of individual to present genetic potency and growth of body parts until adult. Research concern the growth curve model of female and male madura cattle from delivering birth old age 6 months have been executed at Bangkalan District. The aim of this research is to obtain the growth curve model of female and male Madura cattle of pre weaning period. The method of research was observation with the cattle random sample were 57 heads. Data was analyzed by using regression analysis. Result showed that growth curve model of female and male Madura cattle from delivering birth old age 6 month follow equation of allometric regression with determinant coefficient R^2 = 0.9950 and R^2 = 0.9910 with regression equation of $Y = 15.2306(X+1)^{0.8054}$ and $Y = 17.9075(X+1)^{0.7926}$.

260 WIDIASTUTI, R.

Trenbolone residue in tissues and urine of Onggole male calves treated with acetate trenbolone implant. ***Residu trenbolon pada jaringan dan urine dari sapi jantan muda Peranakan Onggole yang diimplantasi trenbolon asetat/*** Widiastuti, R.; Firmansyah, R.; Indraningsih (Balai Besar Penelitian Veteriner, Bogor (Indonesia)). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2007) v. 12(1) p. 60-67, 2 ill., 3 tables; 25 ref.

CALVES; ANIMAL GROWTH PROMOTERS; TRENBOLONE; RESIDUAL EFFECTS; ANIMAL TISSUES; URINE; RESIDUES.

Trenbolone acetate (TBA) is a hormone being permitted to be used as growth promoters for livestocks in several meat exporting countries. The presence of trenbolone residue in animal products might affect human health. The purpose of this study was to determine the

distribution of trenbolone residue (TBA dan 17 Beta-trenbolone) in tissues and urine of Onggole male calves. The implantation of 200 mg TBA as Finaplix-H® was done subcutaneously on the back side of the medial part of ear. Urine was collected periodically until 21 days postimplantation. The animals were terminated on the 21st day postimplantation. Urine, meat and organs were analysed for trenbolone residues. The results showed that TBA residues were detected in tissues of inner and surrounding areas of the implantation sites and liver with an average concentration of 11 ng/g, 2.1 ng/g and 1.6 ng/g respectively. The 17 beta-trenbolone residue was only detected in tissue of inner area of the implantation site at the average concentration of 8.2 ng/g. Meanwhile, none of the residues were detected in urine.

L53 ANIMAL PHYSIOLOGY – REPRODUCTION

261 HERIANTI, I.

Correlation between the live weight of doe and litter performance of Flemish Giants rabbits. ***Hubungan antara bobot induk dan penampilan anak kelinci Flemish Giant***/ Herianti, I.; Prawirodigdo, S. (Balai Pengkajian Teknologi Pertanian Jawa Tengah, Ungaran (Indonesia)); Wuwuh, S. Proceedings of the international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.). Bogor (Indonesia): ICARD, 2008: p. 192-197, 2 ill., 3 tables; 11 ref. 636.92.002/INT/p

RABBITS; BODY WEIGHT; LITTER SIZE; WEIGHT; BIRTH WEIGHT; REPRODUCTIVE PERFORMANCE.

The present study was addressed to investigate the correlation between rabbits does live weight (DLW) and their litter performance. The study employed 28 of six months old female (initial live weight of 2,600 g to 3,650 g) and seven bucks (3,126 g average live weight) Flemish Giant rabbits. The experimental animals were housed individually in the wire-mesh cages, fed diet containing 14% crude protein, 13.4% fat, 22.9% acid detergent fibre, and 10.3 MJ DE/kg. Diet was offered to the rabbits *ad libitum*, and water was available throughout the experimental period. When oestrous occurred, each doe was taken into the buck room to breed. Measurements were conducted for litter size and weight. Results showed that there was no significant correlation between the doe live weight (DLW) and either litter size (LS) or litter weight (LW). The correlation coefficient (r) of DLW and litter size (LS) was 0.1581 (DLW= 2.9205 + 0.0010 LS). While its correlation coefficient to the litter weight (LW) was 0.1957 (DLW= 110.28 + 0.0518 LW). However, the correlation between LS and LW (0.724) was significant (P<0.01; LS = 92.777 + 29.059 LW). Consistently, there was a significant correlation (r=-0.6279; P<0.01) between LS and average kit birth weight (AKBW) (LS= 68.464 + 3.5912 AKBW). The conclusion of the present study is that there was no correlation between live weight of doe and litter performance of Flemish Giant rabbits. The investigation confirmed that the larger litter size, the smaller average birth weight of new born rabbits was delivered by the doe.

262 KUNE, P.

Performance of estrous and fertility rate of inseminated timor bali cow. ***Tampilan berahi dan tingkat kesuburan sapi bali timor yang diinseminasi/*** Kune, P. (Universitas Nusa Cendana, Kupang (Indonesia). Fakultas Peternakan); Solihati, N. *Jurnal Ilmu Ternak* (Indonesia) ISSN 1410-5659 (2007) v. 7(1) p. 1-5, 2 tables; 12 ref.

COWS; ARTIFICIAL INSEMINATION; REPRODUCTIVE PERFORMANCE; OESTROUS CYCLE; FERTILITY.

The study was carried out to determine the performance of estrous and fertility rate of cow inseminated when natural estrous, estrous resulted from synchronization using PGF2a (lutalyse), and natural estrous after synchronized estrous occurred. As many as 21 cows were used to observe the performance of estrous of timor bali cattle of three treatments implemented and 16 cows were inseminated due to their obvious high intensity of estrous. Field experiment method used in the research was completely randomized design. There were three treatments as follows: P1: Cows of natural estrous, P2: Cows of synchronized estrous using PGF2a, and P3: Cows of natural estrous after synchronizing estrous using PGF2a. The replicates were the 21 cows were used for observe the features and estrous intensity, whereas to test the fertility rate (conception rate), only 16 out of 21 cows showing obvious estrous were selected. Results of the research showed that (a) the 21 cows showed estrous with > 70% had obvious intensity estrous (score 3) meaning each cow used shows a maximum estrous performance. The features of estrous appeared include: a transparent fluid coming out from vulva, change in vulva condition, lost of appetite, unquiet, and quiet when being mounted; (b) the average conception rate of 16 cows inseminated of three treatments groups was 68.75%, where P1 and P2 had the same percentage (60%) and P3 has 83.33%. Statistical analysis showed that there was a significant different between P1 and P2 with P3. Based on the results of the study it can be concluded that timor bali cattle were able to show an obvious estrous indicating that the animals were still productive/fertile. This is also supported with its conception rate reaching 80%, however, it is important to have a detail observation on estrous each time before artificial insemination.

L73 ANIMAL DISEASES

263 CHOTIAH, S.

[Utilization of *Bordetella bronchiseptica* microbial germplasm as antibody detection kit]. *Pemanfaatan plasma nutfah mikroba Bordetella bronchiseptica sebagai perangkat deteksi antibodi/* Chotiah, S. (Balai Besar Penelitian Veteriner, Bogor (Indonesia)). *Buletin Plasma Nutfah* (Indonesia) ISSN 1410-4377 (2008) v. 14(2) p. 90-96, 5 ill., 1 table; 20 ref.

BORDETELLA BRONCHISEPTICA; GERMPLASM; ANTIGENS; ELISA; IMMUNE SERUM

Microbe germplasm of *Bordetella bronchiseptica* has been found in pigs in Indonesia and recognized as the causal agent of atrophic rhinitis and pneumonia, and also one of the agents involved in porcine respiratory disease complex. Those microbes have been characterized and conserved ex situ at IRCVS Culture Collection. The aim of this research was to find out seroepidemiological of *B. bronchiseptica* infections at four pig herds in two regencies in Central Java, by utilizing the germplasm as antibody detection kit. The ELISA technique used lypopolysaccharide and sera hyperimmune of *B. bronchiseptica* local isolate as an antigen and positive sera respectively. Referring to cut off level of 0.404, the survey results showed that of 25.4% of 63 pig serum samples examine by ELISA were positively infected by *B. bronchiseptica*; 14.29% and 11.11% from Karanganyar Regencies and Sragen Regencies, respectively. Based on pig ages, it showed that 10.35%, 24%, and 77.8% to be seropositive from less than three-month age group, three-month until five-month age group, and more than five-month age group respectively. Based on pig farm it was showed that 28.60; 30; 13.64; and 40% were seropositive collected from Farm 1, Farm 2, Farm 3 and Farm 4 respectively. The results indicated that *B. bronchiseptica* infection was spread on

four pig herds in two regencies in Central Java with the highest seropositive (77.8%) in more than five-month age group.

264 DARMONO

Mineral deficiency disease in ruminants and its prevention. *Penyakit defisiensi mineral pada ternak ruminansia dan upaya pencegahannya/* Darmono (Balai Besar Penelitian Veteriner, Bogor (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* (Indonesia) ISSN 0216-4418 (2007) v. 26(3) p. 104-108, 3 tables; 24 ref.

RUMINANTS; DEFICIENCY DISEASES; MINERALS; FEED FORMULATIONS.

Essential elements such as micro- and macrominerals have an important role in physiological processes in animals, especially for ruminants which are usually grassing in the field. Green grasses and plants for animal's feed that grow in infertile land (lack of trace elements) generally have low mineral contents. As a consequence, animal that live in this area will suffer from mineral deficiency disease. The animals will be thin, sick and decrease their body weight and production and reproduction capability. Mineral deficiency disease has been reported in livestock in dry area, sandy and peat land and usually belong to the small farmers. Therefore, the quantity of animals in this area is low as reported in Central Kalimantan and south coast of Kalimantan. These problems can be solved by feeding the livestock with feed supplements on block minerals that contain sufficient mineral for the animals.

L74 MISCELLANEOUS ANIMAL DISORDERS

265 SANI, Y.

Neuropathology of organophosphate poisoning in dairy cattle. *Neuropatologi keracunan organofosfat pada sapi/* Sani, Y.; Indraningsih (Balai Besar Penelitian Veteriner, Bogor (Indonesia)). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2007) v. 12(1) p. 74-85, 9 ill., 3 tables; 40 ref.

DAIRY CATTLE; ANIMAL DISEASES; ORGANOPHOSPHORUS COMPOUNDS; POISONING; TOXICITY; NERVOUS SYSTEM DISEASES; BOVINE SPONGIFORM ENCEPHALOPATHY.

The purpose of this study is to investigate pathological changes in brain tissues of Frisien Holstein dairy cattle affected by organophosphate (OP). The study was directed to anticipate spongiform encephalopathy. Samples consisted of animal feeds, sera and brain tissues were collected from Lembang, West Java. Animal feeds (fodders and commercial feed) were collected directly from the dairy farms around Lembang. Sera (31 samples) were from dairy cattle owned by the local farmers and brain tissues were from the local animal slaughter house. Pesticide residues were analysed following a standard procedure using gas chromatography (GC). There was an interaction between pesticide residues in animal feeds, residue level of pesticides in sera and brain tissues to cause encephalopathy in dairy cattle. Pesticide contamination in animal feeds was regarded as the source of encephalopathy in dairy cattle. The total average of OP residues (16.8 ppb) was lower than organochlorines/OC (18.7 ppb) in fodder, showing that pesticides were originated from the contaminated soils. On the other hand, the total average of OP residues in commercial feeds (12.0 ppb), sera (85.6 ppb) and brain tissues (22.7 ppb) were higher than OC (1.8; 16.7; and 5.1 ppb). The OP appears more frequently used for dairy farm activity as insecticides. Histopathological

examination for brain tissues of dairy cattle showed that most cattle were diagnosed as encephalopathy with microscopic changes of vacuolation, neuronal necrosis, chromatolysis of neurons and nucleolysis of neurons. The encephalopathy was confirmed in rats intoxicated with chlorpyrifos methyl as severe brain damage with spongiform-like lesions.

N01 AGRICULTURAL ENGINEERING

266 SUHARYANTO

Impact of the Telaga Tunjung [Indonesia] water reservoir to rice production and farmers income. ***Dampak pembangunan embung Telaga Tunjung terhadap peningkatan pendapatan usaha tani padi sawah***/ Suharyanto (Balai Pengkajian Teknologi Pertanian Bali, Denpasar (Indonesia)); Rinaldi, J.; Widyantoro. [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.). Sukamandi: BB Padi, 2009: p.1569-1581, 3 ill., 5 tables; 9 ref. 633.18-115.2/SEM/i bk4

IRRIGATED RICE; IRRIGATION SYSTEMS; WATER RESERVOIRS; DRINKING WATER; TOURISM; IRRIGATION WATER; ECONOMIC SECTORS; FARM INCOME; FARMERS; PARTICIPATION.

The Telaga Tunjung water reservoir development was one of big projects during five years in Bali with the total investment value of Rp 94 millions. The aim of this reservoir development were: (a) providing the basic resource of drinking water, (b) tourism development area, (c) providing the resource of the irrigation water, and (d) as the source of an economic growth in other sectors. Especially for the water irrigation supplier, the reservoir was expected to supply a total of 420 ha of the Meliling irrigation area, 485 ha in Gadungan and 430 ha in Sungsang with total impact area of 2,624 ha. With regard to the irrigation availability, this study aims to evaluate the impact of reservoir development to the rice production in the area. Data were collected through a survey method involving a total of 80 farmers and 20 leaders of the farmer group. From the planning aspect, the reservoir development was the appropriate priorities, however there are still weaknesses in term of the socialization, benefit, target, increasing planting area and production. These might be due to the fact that the development of the reservoir itself was not finished yet, especially the development of the irrigation canal. The impact of reservoir to rice production showed that the rice yield increased 6% in the areas closest to the reservoir and the farmer income increased by 12% in the areas. The significant impact was occurred in the head area of the reservoir, in which the yield increased from 3.93 t/ha to 4.87 t/ha. While in the tail area which is located a distance from the reservoir, the impact of reservoir development was not clear yet.

P10 WATER RESOURCES AND MANAGEMENT

267 DJUFRY, F.

[Technology of water balance model for predictions water availability and plant management]. ***Teknologi pemodelan neraca air untuk prediksi ketersediaan air dan pengelolaan tanaman***/ Djufry, F. (Balai Pengkajian Teknologi Pertanian Kalimantan Selatan, Banjarbaru (Indonesia)). [Proceedings of national seminar of technology innovation and agricultural institution in effort to improve community empowerment. Book 1].

Prosiding seminar nasional inovasi teknologi dan kelembagaan pertanian dalam upaya peningkatan pemberdayaan masyarakat. Yogyakarta (Indonesia), 24-25 Aug 2007. Buku 1/ Wardhani, N.K.; Mudjisihono, R.; Mashudi, M.F.; Jamal, E.; Wirianata, H.; Suroso; Hartati, R.M.; Hermantoro; Sayekti, A.S. (eds.) Yogyakarta (Indonesia): BPTP Yogyakarta dan BBP2TP, 2007: p. 333-338, 3 ill., 1 table; 14 ref. 631.152/SEM/p bk1

WATER BALANCE; DYNAMIC MODELS; SOIL WATER CONTENT; SIMULATION MODELS.

Water availability is major limitation to crop production and growing season in Indonesia. Each type of crop and farming system require the water which is vary depended on environmental factor and the nature of genetics. Water balance model is one of approach that can be used to anticipate the dynamics of soil water content during crop growth, so that the amount of crop water requirement can be determined, especially at critical period that is at the time of very low soil water content and also under normal condition. The crop water dynamic model (water balance) can be used to analyze and simulate various water balance components, after validated. The simulation is useful in compiling various scenarios in the planning of land use and farm management by various input alternatives and technologies. The water balance dynamics-based model can be served as tools for the determination of planting date and designed the best planting system for the food crops and horticulture in managing dryland and also information on water availability along crop growing. Output model can be combining by regional or national by geographical information system (GIS), so potential water availability at one particular area and at area using water swiftly can be mapped. Model of soil water dynamic is required to find out management strategies that minimize water losses. There is need for an accurate method to calculate and to measure crop water use on real time.

268 SETIOBUDI, D.

Water management for hybrid rice. ***Teknik pengelolaan air pada padi hibrida***/ Setiobudi, D. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). [Proceedings of the seminar on rice research results appreciation supporting national rice production increase. Book 1]. Prosiding seminar apresiasi hasil penelitian padi menunjang P2BN (peningkatan produksi beras nasional). Buku 1., Sukamandi (Indonesia), 19-20 Nov. 2007/ Suprihatno, B.; Daradjat, A.A.; Suharto, H.; Toha, H.M.; Setiyono, A.; Suprihanto; Yahya, A.S. (eds.). Sukamandi (Indonesia): BB Padi, 2008: p. 209-217, 3 tables; 10 ref. 633.18.001.57/SEM/p bk1

ORYZA SATIVA; HYBRIDS; WATER USE; WATER SUPPLY; EFFICIENCY; EVAPOTRANSPIRATION; WATER YIELD.

One of efforts for increasing productivity of lowland rice was through the using hybrid rice. In hybrid rice cultivation, the role of water was very strategic by considering the limiting of water availability and the issue of drought resulted from climate anomaly (El-Nino) periodically even once in three years cycles which threaten on technical irrigated lowland areas as well as intensity of "puso" increasingly. Optimum grain yield expression of hybrid rice depends upon environment and water management. The objectives of the paper were: (a) to review water consumption and water distribution alternatives and its comparison with high yielding varieties and (b) to evaluate various techniques for increasing water use efficiency. Under tropical condition and heavy clay soil texture, the level of water consumption of hybrid rice from transplanting until maturity (7 days before harvesting) per hectare per season for dry season cropping was ranged between 427 mm and 511 mm,

whereas the high yielding variety (HYV) was from 550 mm to 750 mm. In the anticipating of limiting water availability, the alternation submerged (saturated) and nonsubmerged (80% field saturation) during crop growing period was a technique to enhance the saving of water. The average of water productivity or water use efficiency of hybrid rice varied between 0.91 kg/m3 and 0.48 kg/m3. The alternation submerged and nonsubmerged could save irrigation water ranged between 13% and 16% when compared with continuous stagnant flooding or saturation.

P33 SOIL CHEMISTRY AND PHYSICS

269 AL-JABRI, M.

Macro and micro nutrients management in rice crop. *Pengelolaan hara makro dan mikro pada tanaman padi*/ Al-jabri, M (Balai Penelitian Tanah, Bogor (Indonesia)). [Proceedings of the seminar on rice research results appreciation supporting national rice production increase. Book 1]. Prosiding seminar apresiasi hasil penelitian padi menunjang P2BN: peningkatan produksi beras nasional. Sukamandi (Indonesia), 19-20 Nov. 2007. Buku 1/ Suprihatno, B.; Daradjat, A.A.; Suharto, H.; Toha, H.M.; Setiyono, A.; Suprihanto; Yahya, A.S. (eds.). Sukamandi (Indonesia): BB Padi, 2008: p. 89-113, 9 tables; 51 ref. 633.18.001.57/SEM/p bk1

ORYZA SATIVA; TRACE ELEMENTS; SOIL DEFICIENCIES; NPK FERTILIZERS; APPLICATION RATES; SOIL CHEMICOPHYSICAL PROPERTIES; PLANT RESPONSE; YIELD COMPONENTS.

Leveling off phenomenon of rice yield has been occurred since more than two decades. It could not be thoroughly understood that crop growth was function of soil and climate factor conditions. Soil factors condition connected with clay mineralogy and its nutrient reserved. Nutrient reserved in clay mineralogy type 1:1 on Ultisols and Oxisols soil order have been dominated by kaolinit, not the same with nutrient reserved in mix clay of mineralogy type 1:1 and 2:1 on Inceptisols soil order, and clay mineralogy type 2:1 on Vertisols soil order as well. The main constraints on the rice soils which have been opened less than 5 years and dominated by clay mineralogy type 1:1 are that Fe toxicity, P deficiency and inproportional exchangeable cations ratios, so Mg and K deficiency were not avoidable. The main constraints on the rice soils which have been dominated by mix clay mineralogy type 1:1 and 2:1 at north coastal area of Java are unbalanced fertilizer dosage and continuously application of P fertilizer affect to increase rice soils P residual, so that the Zn availability decreased because Zn has been fixed by P become Zn-P compounds. The main constraints on the rice soils which have been dominated by clay mineralogy type 2:1 at East Java and Lombok because of unbalanced fertilizer dosage, and continuous application of P fertilizer causing increase of rice soils residual P, so that the Zn availability decreased because Zn has been fixed by P become Zn-P compounds, and H2S toxicity because (NH4)2S04 fertilizer has been applied for long time. Although P and K fertilizer recommendation based on soil testing have not been realized, but soil test kit as technology innovation that has been launched to farmer as effort for predicting P and K fertilizer recommendation was a pride. Soil test kit application is reasonably to be guided, because soil test kit measures N, P, K status and urea, SP36, and KCl fertilizer dosage only. If available S was lower than its critical value and S fertilizer was not applied, S deficiency could occur; on the contrary if available S was higher than its critical value and S fertilizer was applied, H2S toxicity could occur. Similarly if available Zn was lower than its critical value (< 1 ppm Zn) and Zn fertilizer not applied, Zn deficiency could occur, and rice yield could not be increased. Despite the fact that K status based on soil test kit at Central Sulawesi was at medium level

and KCl fertilizer dosage was 50 kg KCl/ha, but K potential in the laboratory was extremely high and the exchangeable K as available K was extremely very low to low with the range 0.03 - 0.14 cmol/kg far from its critical value (<0.30 cmol/kg), so KCl fertilizer must be added higher than based on the soil test kit. Exchangeable K measurement using ammonium acetate at pH 7.0 on the soil from Central Sulawesi was very low, so its method must be modified. Innovation technology of soil test kit (PUTS) must be guided with laboratory soil analysis for predicting fertilizer recommendation, and if constant flooding could be applied, leveling off phenomenon of rice yield could be overcome, and finally National Rice Yield Increase with target 5 % yearly could be reached. Soil testing program for the coming year must be managed as efforts to produce better result as government responsibility.

270 HERMANTORO

[Application of digital image processing and artificial neural network for predicting organic matter content in soil]. ***Aplikasi pengolahan citra digital dan jaringan saraf tiruan untuk prediksi kadar bahan organik dalam tanah*****/** Hermantoro (Institut Pertanian STIPER, Yogyakarta (Indonesia). Fakultas Teknologi Pertanian). [Proceedings of national seminar of technology innovation and agricultural institution in effort to improve community empowerment. Book 1]. Prosiding seminar nasional inovasi teknologi dan kelembagaan pertanian dalam upaya peningkatan pemberdayaan masyarakat. Yogyakarta (Indonesia), 24-25 Aug 2007. Buku 1/ Wardhani, N.K.; Mudjisihono, R.; Mashudi, M.F.; Jamal, E.; Wirianata, H.; Suroso; Hartati, R.M.; Hermantoro; Sayekti, A.S. (eds.) Yogyakarta (Indonesia): BPTP Yogyakarta dan BBP2TP, 2007: p. 215-221, 6 ill., 10 ref. 631.152/SEM/p bk1

SOIL; ORGANIC MATTER; IMAGE PROCESSING; NEURAL NETWORKS.

The objective of this research was to determine organic matter content in soil using image processing and artificial neural network. The images of soil were captured by digital camera and processed using image process algorithm. The images data, i.e. red, green, blue, hue, saturation, intensity, mean, entrophy, energy, contrast, and homogeneity were extracted from sixty soil samples with different organic matter content. This data were used as the input data for ANN analysis. Output layer of ANN analysis was organic matter content in soil. Based on experiment found, application of image process and ANN for predicting organic matter content in soil have the high accuracy for training and testing of 0.91 and 0.85, respectively, mean square error (MSE) of 0.002761 and 0.00451 in iteration number of 63,600.

271 SUNARMINTO, B.H.

Montmorillonite shrink and swell capacity I: influence of rain dew against soil ploughing on Vertisols soil at Tepus and Playen District, Pegunungan Seribu Wonosari a laboratory research. ***Daya mengembang dan mengerut montmorillonit I: pengaruh intensitas curah-embun terhadap pengolahan tanah Vertisol di Kecamatan Tepus dan Playen, Pegunungan Seribu Wonosari-riset laboratorium/*** Sunarminto, B.H.(Universitas Gadjah Mada Yogyakarta (Indonesia). Fakultas Pertanian); Santosa, H. *AGRITECH* (Indonesia) ISSN 0216-0455 (2008) v. 28(1) p. 1-8, 6 tables; 19 ref.

JAVA; VERTISOLS; TILLAGE; SOIL CHEMICOPHYSICAL PROPERTIES; SOIL TESTING; RAIN.

The laboratory study of montmorillonite clay type on Vertisols from Gunungkidul Regency was accomplished to know the response of some soil characteristics against moisture application by the simulation of rain fall and rain dew. Two naturally peds substances which

have high COLE (coefficient of linear extensibility) value (>0.06) were used with >30 cm diameter; as Ka peds from Karangasem (Tepus District) and as Gd peds from Gading (Playen District) villages. These soil samples were treated by two dosages of aquadest spraying 24 hours a day for 33 days as simulation of rain falls and 12 hours a day for 20 days as simulation of rain dews processes. The soil peds were filtered each 4 days, with size of : < 2 cm, 2 - 4 cm, 4 - 6.4 cm and > 6.4 cm. Results of study were: 1) Karangasem soil has higher clay and organic matter content than Gading soil, so Karangasem soil has lower BD value at moist and dry condition than Gading soil; 2). Clay, organic matter content and C/N ratio have higher value; it contributes in increasing micro pores and total soil porosity, it provokes the higher soil water holding capacity; 3) The COLE value and clay content of Karangasem soil (on coral materials) were higher than that of Gading soil (on marl materials), so Karangasem soil has very high shrink and swell capacity which causes the crushing peds more intensive than that on Gading soil; and 4) The effect of intermittent rain dew is stronger than continuous rain fall as "crusher agents ", especially for Karangasem soil which has high COLE value; oppositely the continues rain fall crushes effectively for Gading soil with lower COLE value.

Q01 FOOD SCIENCE AND TECHNOLOGY

272 SUHANDY, D.

Determination of dry matter in intact mango fruit using near infrared spectroscopy. *Penentuan bahan kering buah mangga secara intact menggunakan near infrared spectroscopy/* Suhandy, D. (Universitas Lampung (Indonesia). Fakultas Pertanian); Prabawati, S.; Yulianingsih; Yatmin. *Jurnal Penelitian Pascapanen Pertanian* (Indonesia) ISSN 0216-1192 (2008) v. 5(2) p. 10-17, 5 ill., 5 tables; 12 ref.

MANGOES; DRIED PRODUCTS; INFRARED SPECTROPHOTOMETRY.

To establish a method in determining the dry matter in mango fruit, non destructively on-plant measurement of dry matter is needed. The study used near infrared (NIR) spectroscopy for non destructive measurement of dry matter in mango fruit. Using a portable spectrometer, spectra for each sample were acquired in absorbance mode at two different positions. The actual value of dry matter of mango was measured by drying the mango sampled at 70°C for 96 hours. The partial least squares (PLS) regression was used to develop a calibration equation. The NIR spectroscopy method successfully determined the dry matter of mango fruits with correlation coefficient (r) between predicted and actual values was 0.93, standard error of prediction (SEP) of 0.89 and bias of 0.12.

Q02 FOOD PROCESSING AND PRESERVATION

273 BUDIYANTO, A.

Effect of temperature and time of extraction on characters of pectin extracted from Siam citrus (*Citrus nobilis* L.) pulp. *Pengaruh suhu dan waktu ekstraksi terhadap karakter pektin dari ampas jeruk siam (Citrus nobilis L.)/* Budiyanto, A.; Yulianingsih (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Jurnal Penelitian Pascapanen Pertanian* (Indonesia) ISSN 0216-1192 (2008) v. 5(2) p. 37-44, 1 ill., 12 tables; 26 ref.

CITRUS; PECTINS; PULP; TEMPERATURE; TIME; EXTRACTION; CHEMICOPHYSICAL PROPERTIES

Indonesian citrus production during the last three years (2005 - 2007) tends to increase. High citrus production causes sell price decrease, therefore citrus should be processed. Simple citrus processing in form of concentrated citrus and juice would produce waste, such as pulp. Pectin is one of citrus pulp compounds which have functional components in food and pharmaceutical industries. The objective of this research was to study influence of extraction temperature and time toward pectin characteristic of Siam citrus pulp. The research used factorial completely randomized design with two factors. Factor A and B consisted of three levels which each factor used three replications. Factor A were A1= 65°C, A2= 80°C, A3= 95°C, while factor B were B1= 40 minutes, B2= 60 minutes and B3= 80 minutes. The result showed that the yield of pectin was around 13.67 - 16.32%, low methoxyl pectin with methoxyl content about 4.87 - 6.95% (<7%) and water content 7.94 - 11.91% (<12%). The galacturonat content (<65%) were produced from extraction at temperature 95°C during 40, 60 and 80 minutes and 80°C during 80 minutes. Based on pectin characteristic result, the optimum condition of pectin extraction is treatment of temperature 95°C during 40 minutes.

274 CHAIRUNNISA, H.

Nutritional aspects and organoleptic characteristics at different ripened time of gouda semi hard cheeses. ***Aspek nutrisi dan karakteristik organoleptik keju semi keras gouda pada berbagai lama pemeraman/*** Chairunnisa, H. (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Peternakan). *Jurnal Ilmu Ternak* (Indonesia) ISSN 1410-5659 (2007) v. 7(1) p. 16-21, 3 ill., 2 tables; 17 ref.

MILK; CHEESE; CHEESEMAKING; FERMENTATION; RIPENING; NUTRITIVE VALUE; ORGANOLEPTIC PROPERTIES

The aims of this study were to determine the nutritional aspects of semi hard gouda cheese due to the percentage of moisture on fat free basis/MFFB, fat in dry basis/FDB and soluble protein, and also analyze its acceptability. There were four treatments of different time of ripened Gouda semi hard cheese (2, 4, 6 months of ripening process, and fresh Gouda cheese), that analyzed by using completely randomized design with five replications. The results indicated that the moisture on fat free basis content of semi hard cheese decreased during ripening process, and significantly correlated with the penetrometer firmness, resulting in the gouda cheese become very firm. The best-liked treatments were the semi hard gouda cheese of two or four months ripened, and also fresh cheese due to the overall acceptance, included appearance, colour and consistency, that have lower in moisture content (28.52-48.14%), fat content (33.44-43.54%), and soluble protein (9.17-25.26%).

275 DJAAFAR, T.F.

Effect of blanching and soaking in calcium solution of yam tuber and chips. ***Pengaruh blanching dan waktu perendaman dalam larutan kapur terhadap kandungan racun pada umbi dan ceriping gadung***/ Djaafar, T.F.; Rahayu, S.; Gardjito, M. (Balai Pengkajian Teknologi Pertanian Yogyakarta (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia) ISSN 0216-9959 (2009) v. 28(3) p. 192-198, 3 ill., 5 tables; 11 ref.

YAMS; TUBERS; DRIED PRODUCTS; SOAKING; BLANCHING; TIME; TOXINS; CALCIUM; PROXIMATE COMPOSITION.

Yam chips is commonly used as a snack food, made of yam tuber (*Dioscorea hispida*). To produce the chips, it took about six days to remove the toxic compounds (HCN and dioscorine) in the tuber using ash absorbance. The objectives of this research were to find

rapid yam chips production with low of HCN and dioscorine content and to determine of blanching of fresh tuber chip and soaking the blanched tuber chip in $Ca(OH)_2$ 0.3% solution, related to the HCN and dioscorine content. Yam chips were blanched for 30 and 60 seconds and soaked the blanched tuber chip in $Ca(OH)_2$ 0.3% solution for 2, 4, and 6 hours and the HCN and dioscorine content were analyzed. Yam chips produced using blanching of fresh tuber chip for 30 seconds and soaking the blanched tuber chip in $Ca(OH)_2$ 0.3% solution for 6 hours, had lower HCN content (5.65 ppm) than that of traditional yam chips production (30.10 ppm). Blanching and soaking of fresh tuber chip on calcium hydroxide could be recommended for obtaining safer and cleaner yam chips.

276 HARSOJO

Microbiological aspects of irradiated beef jurky. *Aspek mikrobiologi dendeng sapi iradiasi*/ Harsojo; Andini, L. (Pusat Aplikasi Teknologi Isotop dan Radiasi, Jakarta (Indonesia)). [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.; Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 273-277, 3 tables; 10 ref. 621.039.8/SIM/p

BEEF CATTLE; DRIED MEAT; GAMMA IRRADIATION; MICROBIOLOGICAL ANALYSIS; ENTEROBACTER; COLIFORM BACTERIA; MOULDS; MOISTURE CONTENT; BIOLOGICAL CONTAMINATION.

An experiment was conducted to study the effect of irradiation on beef jurky from three locations. Irradiation was done with gamma rays at the doses of 0, 1, 2, and 3 kGy and preserved at room temperature for 6 days. The irradiation was done at a multipurpose panoramic batch irradiator (IRPASENA PATIR-BATAN) with a dose rate of 1.149 kGy/h. Parameters of these study are aerob bacteria, coliform, mould and water content. The result shows that beef jurky coded B is the best among the others based on initial contamination and water content. Irradiation dose up to 3 kGy is not enough to eliminate all the microbes. Water content plays an important role for the initial microbe contamination.

277 PUTRANTO, W.S.

Proteolitic activity of *Lactobacillus acidophilus* in fermentation of dairy cow milk. *Aktivitas proteolitik Lactobacillus acidophilus dalam fermentasi susu sapi*/ Putranto, W.S. (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Peternakan). *Jurnal Ilmu Ternak* (Indonesia) ISSN 1410-5659 (2007) v. 7(1) p. 69-72, 2 ill., 2 tables; 7 ref.

MILK; DAIRY CATTLE; PROCESSING; FOOD TECHNOLOGY; FERMENTATION; LACTOBACILLUS ACIDOPHILUS; PROTEASES; CHEMICOPHYSICAL PROPERTIES

Lactobacillus acidophilus is able to produce extracellular protease. The aim of this research was to find out its proteolytic activity. The enzyme was purified using centrifugation, 45% ammonium sulfate precipitation, chromatography column using Sephadex G-100. The result showed that *Lactobacillus acidophilus* protease has specific activity of 0.752 µ/mg (crude extract), 1.24 µ/mg (purified using 45% ammonium sulfate precipitation) and 1.15 µ/mg (gel filtration). The purification yielded 12.6% extracellular protease from crude extract.

278 SUNARLIM, R.

Lactobacillus sp. from dadih as bacterial starter on processing of fermented milk in Indonesia. *Potensi Lactobacillus sp. asal dari dadih sebagai starter pada pembuatan susu fermentasi khas Indonesia/* Sunarlim, R. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Buletin Teknologi Pascapanen Pertanian* (Indonesia) ISSN 1858-3504 (2009) v. 5(1) p. 69-76, 3 tables; 25 ref.

LACTOBACILLUS; BUFFALOES; MILK; PROCESSING; FERMENTATION; BACTERIOSES.

Milk is a nutritious food because of protein and lactose content, as well as vitamin and mineral content. Milk from cow, buffalo and goat is the most ones consumed by people. Cow milk is also fermented to be yoghurt, yakult and kefir through fermentation process using bacterial starter from *Lactobacillus* sp. Fermented milk from West Sumatra namely dadih is made from buffalo milk. Fermentation of milk without bacterial starter takes place inside bamboo for 24-48 hours at room temperature. Due to lower production of buffalo milk, the cow milk is better to be used to make *dadih*, therefore the production of *dadih* would be higher and sustainable. Bacterial starter could be used by inoculating bacteria from *dadih* (*L. plantarum*) to produce good quality and flavour. Starter bacteri is made by inoculating from dadih (*Lactobacillus plantarum*) in cow milk, so that the resulted fermented milk has better quality and flavor and continuously produced. Using bacteria *L. plantarum* 3% on fermented milk was more favourable in colour, flavour and taste except viscosity compare with *dadih* from West Sumatra. Combination of *L. plantarum* with bacterial starter yoghurt was obtained total tritrated acid which is not significantly different compare with combined with *S. thermophilus*, pH value was significantly different. Combination of bacterial starter yoghurt with *L. plantarum* that stored for one week was very favourable with pH value 3.09, total titrated acid 1.29%, total solid 17.74% and viscocity 8.35 Pa.s. Combination of bacteria *L. plantarum* with *L. acidophlus* or *B. bifidum* was not significantly different althought the three bacterias are known as probiotic bacteria. *L. casei* was also found in *dadih* from West Sumatra, so that it can be used as potential bacterial starter in the future.

279 SURADI, K.

Effect of dietary levels of cassava meal on the physical characteristic and acceptability of rabbit meatball. *Pengaruh tingkat penggunaan tepung tapioka terhadap sifat fisik dan akseptabilitas baso kelinci/* Suradi, K. (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Peternakan). Proceedings of the international conference on rabbit production, Bogor (Indonesia), 24-25 Jul 2007/ Raharjo, Y.C.; Talib, C.; Herawati, T.; Brahmantiyo, B.; Praharani, L.; Lukefahr, S.D.; Maertens, L.; Handiwirawan, E.; Martindah, E. (eds.). Bogor (Indonesia): ICARD, 2008: p. 180-184, 1 table; 13 ref. 636.92.002/INT/p

RABBITS; MEAT PRODUCTS; PROCESSING; INGREDIENTS; TAPIOCA; CHEMICOPHYSICAL PROPERTIES; QUALITY; ORGANOLEPTIC PROPERTIES; CONSUMER BEHAVIOUR.

Meatball is a processed meat product which is popular in any levels of society. The main ingredient of the product is commonly from beef, but it always possible to use rabbit meat. In the process of meatball production, filling ingredients is needed to obtain cohessive and rubbery round, and reduce shrinkage. The aim of the research is to obtain an appropriate meal use which produces good physic character of the meatball and preferred by consumers. The research used completely randomized design (CRD) with three treatments level of

cassava meal, i.e. 10%, 15% and 20% and replicated six times. The physical characters variables that observed were the hardness, the water holding capacity and cooking losses, while acceptability was taste and rubbery. The result showed that increasing in using cassava meal from 10%, 15% to 20% did not mainly affect rubbery and water holding capacity, but reduced cooking losses of the rabbit meatball. The level of popularity to the taste and the rubbery of meatball with various level of using cassava meal were not different. Thus, to obtain the meatball with good physical character and popular in consumer, cassava meal of 20% can be used.

280 SURADI, K.

Hedonic scaling of meatball from various kind of meat on several statistic approaches. ***Tingkat kesukaan bakso dari berbagai jenis daging melalui beberapa pendekatan statistik/*** Suradi, K. (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Peternakan). *Jurnal Ilmu Ternak* (Indonesia) ISSN 1410-5659 (2007) v. 7(1) p. 52-57, 1 ill., 4 tables; 11 ref.

MEAT; MEAT PRODUCTS; FOODS; CONSUMER BEHAVIOUR; ORGANOLEPTIC PROPERTIES; STATISTICAL METHODS

The aim of this research was to know the hedonic scaling meatball from various meat, with statistic examination through different approaches. The treatments were four kinds of meatballs made from beef, chickens, rabbit and lamb meat, each was from male animal, whereas 15 rather trained panelists were as replications. The panelists were grouped as a replication on Friedman test and randomized block design (RBD) while in Kruskal Wallis test and completely randomized design (CRD), the panelists were assumed as equal replication. The measured variables were the hedonic scaling on taste, smell and toughnes, such as highly preferred, preferred, slightly preferred, moderately preferred, and unprefer. The result showed that hedonic scale on taste, smell and tough of beef and lamb meatball were preferred by the panelists, followed by meatball from chickens and rabbit meat. Statistical approaches with Friedman test, Kruskal Wallis test, completely randomized design and randomized block design on hedonic scaling, commonly was not significant, only taste through Friedman test resulted significant ($P<0.05$).

281 WIDANINGRUM, N.

Effect of different technique of flavouring and vacuum frying temperature on chemical and sensory properties of young chickpea (*Phaseolus radiatus*) chips. ***Pengaruh cara pembumbuan dan suhu penggorengan vakum terhadap sifat kimia dan sensori keripik buncis (Phaseolus radiatus) muda***/ Widaningrum, N.; Setyawan; Setyabudi, D.A. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Jurnal Penelitian Pascapanen Pertanian* (Indonesia) ISSN 0216-1192 (2008) v. 5(2) p. 45-54, 4 tables; 18 ref.

CHICKPEAS; FLAVOURING; FRYING; TEMPERATURE; CHEMICAL COMPOSITION; ORGANOLEPTIC ANALYSIS.

In Indonesia, availability of vegetables is guaranteed all year long. In the effort to prolong its storage time, technology to lessen damages and rot of vegetable is needed. One of technologies was through vacuum frying. The objective of this research was to obtain processing technology of ready to eat young chickpea as vegetable chips. Research started with preparation of young chickpea, and soaked them in $CaCl_2$ solution (1000 ppm, t=30'). For wet flavouring method, young chickpea was boiled with flavour, meanwhile for dry

flavouring method, young chickpea was steam blanched. After that, young chickpea was then vacuum fried at 60-70°C, 70-80°C, and 80-90°C with vacuum pressure -72 cmHg. Products were then packaged in aluminum foil. Research was conducted with 4 replications. Research result showed that yield of young chickpea chips were 13.58-14.17% with vacuum frying in 1.08-1.41 hours. For both flavouring methods on young chickpea chips, moisture was 6.33-7.39%; ash 4.45-6.10%; fat 33.95-42.93%; protein 10.86-12.24%; crude fibre 11.94-14.10%; free fatty acid (FFA) 0.62-0.70%; vitamin C 0.27-0.46 mg/100g; and vitamin A 135.54-265.39 ppm. Sensory evaluation showed that interaction of different way of flavour and temperature did not have significant effect (P>0.05) to all parameters (color, odor, texture, taste, crispiness and acceptability of chickpea chips). But as individual factor, panellists assess that flavour had significant effect (P<0.05) to chickpea chips taste, meanwhile temperature had significant effect (P<0.05) to crispiness of chickpea chips. In general, panellists expressed rather like for all parameter of chickpea chips sensory evaluation.

Q03 FOOD CONTAMINATION AND TOXICOLOGY

282 AGUSTA, H.

Excellence of rice consumption safety based on heavy metal status in the soil and its plant uptake. ***Keamanan konsumsi beras berdasarkan status logam berat dalam tanah dan absorpsi tanaman padi***/ Agusta, H. (Institut Pertanian Bogor (Indonesia). Fakultas Pertanian)); Kurnia, U.; Diana, A.; Hermanto. [Proceedings of the seminar on rice research results appreciation supporting national rice production increase. Book 1]. Prosiding seminar apresiasi hasil penelitian padi menunjang P2BN: peningkatan produksi beras nasional. Sukamandi (Indonesia), 19-20 Nov 2007. Buku 1/ Suprihatno, B.; Daradjat, A.A.; Suharto, H.; Toha, H.M.; Setiyono, A.; Suprihanto; Yahya, A.S. (eds.) Sukamandi (Indonesia): BB Padi, 2008: p. 165-171, 3 tables; 10 ref. 633.18.001.57/SEM/p bk1

ORYZA SATIVA; HEAVY METALS; BARIUM; CLAY SOILS; ABSORPTION; IDENTIFICATION; CONTAMINATION; FOOD SAFETY; FOOD CONSUMPTION.

The purpose of the study was to identify the status of three most considered heavy metals Ba, Cd and Cr in the soil (screened from totally 14 heavy metals in 26 observation points) as well as its distribution in the rice plant, especially for a safety consumption based on heavy metal status in the rice grain. Field assessment was conducted from September 2006-June 2007 in Bojonegoro, East Java. The heavy metals concentration in the soil ranged from 223-1506 ppm Ba, 0.77-1.83 ppm Cd and 4.70-12.42 ppm Cr. The heavy metals were still found in roots (0.08 ppm Ba, 0.30 ppm Cd, 5.39 ppm Cr) and straw (0.02 ppm Ba, 0.08 ppm Cd and 0.62 ppm Cr). However, its concentration in the polished grain was unnoticeable.

283 LISTIANINGRUM, Y.B.

Heavy metals content in chest, thigh, intestine, and liver of native chicken under free range management surrounding the candi industrial estate Semarang (Indonesia) after being cooked. ***Kandungan logam berat pada dada, paha, usus, dan hati ayam kampung yang dipelihara secara umbaran di daerah sekitar industri candi Semarang setelah dimasak/*** Listianingrum, Y.B.; Prihasto, L.; Dwiloka, B.; Hintono, A. (Universitas Diponegoro, Semarang (Indonesia). Fakultas Peternakan); Atmomarsono, U. [Proceedings of the symposium and exhibition of isotope and radiation application technology]. Prosiding simposium dan pameran teknologi aplikasi isotop dan radiasi, Jakarta (Indonesia), 5-6 Aug 2008/ Mugiono; Sopandi, D.; Hudiyono, S.; Kuswadi, A.N.; Irawati, Z.; Sidauruk, P.;

Winarno, H.; Sobrizal; Chosdu, R. (eds.). Jakarta (Indonesia): PATIR, 2008: p. 291-298, 2 tables; 23 ref. 621.039.8/SIM/p

CHICKENS; MEATS; HEAVY METALS; FREE RANGE HUSBANDRY; INDUSTRY; BOILING; STEAMING; FRYING.

The study was conducted to investigate the heavy metals content in chest, thigh, intestine, and liver of native chicken under free range management surrounding the candi industrial estate Semarang after being cooked. The study was analyzed by completely randomized design, with 3 treatments and 5 replications in each treatment. The heavy metals content were analyzed with neutron activation analysis (NAA) and atomic absorption spectroscopy. The data were analyzed with ANOVA. Duncan's multiple range test was used for further analysis to show the differences in each treatments. The result indicated that Fe in fresh chest, thigh, intestine, liver, and Zn in fresh thigh and liver exceeded maximum level allowed. Boiling and frying the chicken meat has significantly ($P<0.05$) decreased Rb, Cs, and Sc in chest and thigh; meanwhile boiling and steaming decreased Rb and Cs in intestine ($P<0.05$). The conclusion of this study is that the heavy metals content of chest and thigh can be decreased more by frying than by boiling, meanwhile the heavy metals content in intestine and liver can be decreased more by steaming than by boiling.

284 WINARTI, C.

Patulin contamination in apples and apple products. *Kontaminasi patulin pada buah dan produk olahan apel/* Winarti, C.; Miskiyah; Munarso, S.J. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Buletin Teknologi Pascapanen Pertanian* (Indonesia) ISSN 1858-3504 (2009) v. 5(1) p. 33-38, 1 ill., 3 tables; 24 ref.

APPLES; FRUITS; PROCESSING; APPLE JUICE; PLANT PRODUCTS; PATULIN; CONTAMINATION.

Patulin (4-hydroxy-4H-furo (3,2c) pyran-2(6H)-one) is a mycotoxin produced by a number of fungi commonly found in fruit and fruit-based products, most notably apples. Several studies investigated the potential adverse health effects of patulin including hyperaemia, bleeding, edema, ulceration, and intestinal hemorrhage. At high concentration, patulin has carcinogenic, mutagenic, teratogenic, immunotoxic, and neurotoxic effect. The aim of research was to identify the patulin level in apple and apple products, both from local growers and imported apple fruits. Fifteen samples of apples consisting of Manalagi (12) and Rome Beauty (3), and eight samples of imported apples, i.e Fuji and Washington, were purchased from growers and retails in Malang and Bogor. Twenty samples of apple juice from local producers, 5 samples imported apple juice, 2 samples of baby food containing apple, and 2 samples of apple cider were also purchased. Analyses was done on patulin content using HPLC and identification of fungi in fresh apple. Research results showed that apple var. Manalagi contained *Penicillium* sp., *Aspergillus* sp., and *Fusarium* sp.; meanwhile Fuji apple contained only *Penicillium* sp. and *Aspergillus* sp. Results of patulin analysis showed that 33.3% of local apple fruit was positively detected to contain patulin, whereas 1 contaminated samples had patulin concentration higher than 50 mg/kg. Patulin was detected in 37.5% of imported apples. Patulin was also detected in 17.6% of local apple juice and 60% for imported apple juice. One sample of apple cider was detected to contain patulin, while no patulin were detected in all baby food.

Q04 FOOD COMPOSITION

285 BUDIYANTO, A.

Amylograph properties of some medium rice varieties and their utilization in food industries. ***Sifat amilografi beras berkadar amilosa sedang dan prospek pemanfaatannya untuk industri pangan/*** Budiyanto, A.; Widowati, S.; Santosa, B.A.S. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.). Sukamandi: BB Padi, 2009: p.1535-1547, 5 tables; 14 ref. 633.18-115.2/SEM/i

RICE; VARIETIES; MEASURING INSTRUMENTS; RHEOLOGICAL PROPERTIES; AMYLOSE; JELLIFICATION; PROXIMATE COMPOSITION; VISCOSITY; FOOD INDUSTRY.

Analysis of amylograph was conducted to study starch gelatinization properties. Gelatinization differs for each rice variety. Difference of gelatinization influences the utilization of rice for either food or nonfood processed products. This research was aimed to analyze the amylograph properties of 11 Indonesian medium amylose rice varieties, i.e. Aek Sibundong, Mekongga, IR-64, Sarinah, IR-74, Ciherang, Cibogo, Widas, Conde, Ciujung, and Cisadane. This research was conducted in the Indonesian Center for Agricultural Postharvest Research and Development, Bogor, in 2007. The results showed that time and gelatinization temperature of the rice samples were around 37-40 minutes and 85.5-90°C, respectively. Viscosity at 93°C and after 20 minutes retention was about 100-320 BU and 175-415 BU, respectively. While viscosity at 50°C and after 20 minutes retention was about 500-860 BU and 470-790 BU. The highest viscosity was Sarinah variety and the lowest was on Ciujung variety. All starch rice varieties tested showed high gelatinization temperature. It means that all rice varieties evaluated were suitable as the raw material for high stabilized food products. It is expected that the research findings will be usefull as an alternative variety for raw material of processed products. It was also good information for the breeder in developing healthy rice variety and for food industries in supplying and developing processed food which suitable for consumer demand.

286 CHAYATI, I.

Physicochemical properties of monofloral honeys from Spesial Region of Yogyakarta and Central Java. ***Sifat fisikokimia madu monoflora dari Daerah Istimewa Yogyakarta dan Jawa Tengah/*** Chayati, I.(Universitas Negeri Yogyakarta, Karangmalang (Indonesia)). *AGRITECH* (Indonesia) ISSN 0216-0455 (2008) v. 28(1) p. 9-14, 4 tables; 21 ref.

HONEY; CHEMICOPHYSICAL PROPERTIES; PROXIMATE COMPOSITION; ORGANOLEPTIC PROPERTIES; JAVA.

Physical and chemical properties of monofloral honeys from Yogyakarta and Central Java provinces were evaluated. Four honey samples were used in this study, namely kaliandra, klengkeng, rambutan, and randu honey. Kaliandra honey was supplied by beekeepers from Kulon Progo, Yogyakarta. Klengkeng honey was from Ambarawa, rambutan honey from Magelang, and randu honey from Pati. Three later sources of honey belongs to Central Java Province. Analysis of physical properties of honeys was moisture content, colour; and

viscosity. Analysis of chemical properties of honeys was pH, total phenolic compound; and sugar content. Results showed that the physico-chemical properties of monofloral honeys varied as follows: moisture content (18.95-26.52)%, red colour (2.23-4.13), yellow colour (10.00-40.33), viscosity (3.99-18.24) Poise, pH (3.87-4.48), phenolic compound (371.4-1,188.3) mg/100 ml, maltose content (6.71-28.82) mg/100 ml, glucose content (14.63-18.82) mg/100 ml, and fructose content (28.82-41.30) mg/100ml.

287 INDRASARI, S.D.

Nutritional value of minerals on new high yielding rice varieties. *Kandungan mineral beras varietas unggul baru*/ Indrasari, S.D.; Wibowo, P.; Daradjat, A.A. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.). Sukamandi: BB Padi, 2009: p. 1457-1472, 3 tables; 36 ref. 633.18-115.2/SEM/i bk4

RICE; HIGH YIELDING VARIETIES; MINERAL CONTENT; TRACE ELEMENTS; NUTRITIVE VALUE.

The nutritional value of minerals has not been well understood yet by most people. Up to now, rice is known merely as the source of energy and protein, eventhough it actually contains minerals and vitamins. Minerals can be categorized into macro minerals (Ca, P, Mg, Na, K, Cl, S) and micro minerals (Fe, I, Zn, Cu, Mn, Cr, Co, Se, Mo, F). As nutrient element, mineral is needed in a small amount by the human body, but its role is extremely important in metabolism of the body, such as in the building of the body network, in the activating, regulating, and controlling the metabolism process as well as in transferring the nerve messages. A number of superior rice varieties containing specific mineral element has been developed through rice breeding. Minerals analyses of milled rice of 51 varieties with 80 % milling degree have been carried out in 2007 at WAITE Analytical Service Laboratory, the University of Adelaide using the Inductively Couple Plasma (ICP) instrument. This instrument is able to analyze a total of 16 different minerals of rice, namely iron (Fe), manganese (Mn), copper (Cu), zinc (2n), calcium (Ca), magnesium (Mg), natrium (Na), potassium (K), phosphorus (P), sulfur (S), boron (B), molybdenum (Mo), cobalt (Co), nickel (Ni), aluminum (Al), and cadmium (Cd). Depending on the rice variety, the specific content of mineral in rice might be different. Bahbutong and Batang Gadis varieties (Ca and P source) and Batutegi (Ca and K source) are good to be consumed to prevent osteoporosis (bone brittle). Dodokan variety was proven to be the source of Ca, Mg, K, Zn, Mn, and Cu. Indragiri is rich in Mg, Na, P, S, and Mn. Kalimutu is rich in Na, S, Zn, and Cu. Way Rarem is rich in Mg, K, P, and Mn, while Winongo rich of Mg, P and S. Dendang, Setail, and Limboto are rich in Na and K. The rice varieties which are rich in Mg, such as Dodokan, Indragiri, Way Rarem, and Winongo are recommended to be consumed by the autis children. While the rice varieties which are rich in zinc, such as Dodokan, Gajah Mungkur, and Kalimutu are recommended to be consumed by the anemia vulnerable groups, such as children under five, the school children, the pregnant woman, and the hard workers.

288 MURDIATI, A.

Effect of storage and frequency extraction on sugar content of pumpkins (*Cucurbita moschata*) extract. *Pengaruh variasi lama simpan dan frekuensi ekstraksi terhadap kandungan gula ekstrak buah labu kuning (Cucurbita moschata)/* Murdiati, A.

(Universitas Gadjah Mada Yogyakarta (Indonesia). Fakultas Pertanian); Sisilia, D. *AGRITECH* (Indonesia) ISSN 0216-0455 (2008) v. 28(1) p. 43-49, 9 tables; 12 ref.

CUCURBITA MOSCHATA; PUMPKINS; EXTRACTS; CARBOHYDRATE CONTENT; KEEPING QUALITY; CHEMICOPHYSICAL PROPERTIES; REDUCING SUGARS.

The purpose of this research was to determine the optimal condition for the storage duration of pumpkins and frequency of extraction in order to produce extract which has maximum sugar content and minimum volume. The research was done on postharvest pumpkins which were stored for 0, 2, 4, 6, 8, 12 weeks. Pumpkins were peeled; crushed and pressed using hydraulic hand press for 1, 2, 3, 4, 5 times of extractions. The extracts were analysed for chemical properties, i.e. total sugar content, reducing sugar content, pH, and physical properties (turbidity and colour). The result showed that the extract of pumpkins which had maximum total sugar content and low volume could be produced on pumpkins which stored for 8-12 weeks and extracted twice.

289 PURWANI, E.Y.

Molecular structure of starch and its implication to grain quality. *Struktur molekular pati dan implikasinya terhadap kualitas beras*/ Purwani, E.Y.; Haliza, W. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.). Sukamandi: BB Padi, 2009: p.1417-1427, 8 ill., 2 tables; 11 ref. 633.18-115.2/SEM/i bk4

RICE; STARCH; CHEMICOPHYSICAL PROPERTIES; AMYLOPECTIN; JELLIFICATION; QUALITY.

Rice is important carbohydrate source for the human being, with starch as its component. The diverse of the physico-chemical and functional properties of starch is related to its specific structure which is related to the starch biosynthesis pathway. Therefore, it is important to understand the relationship among the biosynthesis, the structure, physicochemical, and the functional. Chalky grain was known to content less amylase than the transparent grain. The A and the B1 chain were also known to be more in the chalky grain than that in the transparent grain. The short chain amylopectin destabilized the lamella structure, thus lowering the gelatinization temperature.

290 PURWANINGSIH, H.

Utilization of the red rice as the substitute in the bread production. *Pemanfaatan beras merah lokal D.I. Yogyakarta sebagai bahan substitusi dalam pembuatan roti tawar*/ Purwaningsih, H.; Saputro, A.M.S.; Setyono, B.; Djaafar, T.F. (Balai Pengkajian Teknologi Pertanian Yogyakarta (Indonesia)). [Rice technology innovation to anticipate global climate change supporting food security: proceedings of the national seminar on rice 2008. Book 4]. Inovasi teknologi padi mengantisipasi perubahan iklim global mendukung ketahanan pangan: prosiding seminar nasional padi 2008. Sukamandi (Indonesia), 23-24 Jul 2008. Buku 4/ Setyono, A.; Nugraha, U.S.; Indrasari, S.D.; Agus S.Y. (eds.). Sukamandi: BB Padi, 2009: p.1549-1556, 1 ill., 6 tables; 5 ref. 633.18-115.2/SEM/i bk4

RICE; LAND VARIETIES; SPECIES; CHEMICOPHYSICAL PROPERTIES; RICE FLOUR; MOISTURE CONTENT; PROTEIN CONTENT; CRUDE FIBRE; ORGANOLEPTIC PROPERTIES; BREAD.

An experiment to evaluate the utilization of the red rice as the substitute in the bread production on physical characteristic, chemical properties, and organoleptic test has been done in the Postharvest Laboratory of Assessment Institute for Agricultural Technology (AIAT) Yogyakarta. The local red rice varieties of Cempo and Segreng were used in this experiment. Red rice powder was prepared to substitute wheat flour with the portion amount between red rice powder and wheat flour was 1:1; 1:3; and 1:7. The variables observed for chemical characteristic were harsh fiber, moisture content, and protein. The physical characteristic observation was on texture, and for organoleptic test was done for its color, flavor, taste, and consumer preference. A completely randomized design with three replications was used in this experiment and followed with Duncan Multiple Range Test (DMRT). Research result indicated that moisture content of the bread made of red rice powder of Cempo and Segreng varieties showed significance (Cempo was 12.5% and Segreng was 13.3%). The bread protein of red rice powder of Cempo was higher compared to Segreng which was 10.4% and 9.6%, respectively. The highest bread harsh fiber was found on the mixture of Cempo and wheat flour with 1:1 which was 9.2%. The organoleptic test showed that the 1:1 mixture of red rice powder of Segreng and wheat flour was preferred by consumer.

291 WARIYAH, C.

Physical properties and acceptability of calcium fortified rice. ***Sifat fisik dan aseptabilitas beras berkalsium/*** Wariyah, C. (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Pertanian). *AGRITECH* (Indonesia) ISSN 0216-0455 (2008) v. 28(1) p. 34-42, 5 tables; 33 ref.

RICE; VARIETIES; CALCIUM; CHEMICOPHYSICAL PROPERTIES; QUALITY; PROXIMATE COMPOSITION; ORGANOLEPTIC ANALYSIS.

Calcium fortified-rice from three rice varieties, i.e. low, medium and high-amylose rice was fortified with calcium acetate, calcium lactate and calcium gluconate. Those rice were made through consecutive steps of processing, i.e. soaking in 0.8% calcium salt solution at temperature of 80, 90 and 100 ^{o}C, draining and drying at 50-60^{o}C to moisture content of 10-11 %. The soaking target was to achieve calcium content of rice of 100-110 mg/100 g. Physical properties (texture and colour) and acceptability of fortified-rice were evaluated. The result showed that soaking at temperature of 80 and 90^{o}C gave brittle product, while soaking at 100^{o}C gave hard one. Soaking at high temperature tended to reduce the lightness (L), yellowness (b) and redness (a) of the fortified rice. Acceptability of fortified-rice resulted from soaking at 80^{o}C was higher than that at 90 and 100^{o}C. Based on physical properties and acceptability of both fortified and cooked-rice, soaking process at 80^{o}C, and addition of calcium-lactate or-gluconate used as a fortificants produced the most acceptable product.

292 WINARTI, S.

Utilization of morinda fruit (*Morinda citrifolia*) and roselle flower (*Hibiscus sabdariffa* Linn.) for fruit leather production. ***Pemanfaatan buah mengkudu (Morinda citrifolia) dan kelopak bunga rosela (Hibiscus sabdariffa* Linn.*) untuk pembuatan fruit leather/*** Winarti, S. (Universitas Pembangunan Nasional Jawa Timur (Indonesia). Fakultas

Pertanian). *AGRITECH* Pertanian (Indonesia) ISSN 0216-0455 (2008) v. 28(1) p. 22-27, 5 tables; 17 ref.

HIBISCUS SABDARIFFA; FRUIT PRODUCTS; USES; ORGANOLEPTIC ANALYSIS; CHEMICOPHYSICAL PROPERTIES; TECHNICAL PROPERTIES.

Research on production of fruit leather from morinda-roselle with variation of proportion and added binding agent was carried out. Fruit leather is a food product like skin having consistency and special taste from the special fruits. In Indonesia, fruit leather is a new product and has not yet been found at the market, but in overseas this product is very famous as the snack food. The purpose of this research were to find the best proportion between morinda and roselle, which is preferable for consumers and to find the best binding agent to produce fruit leather from morinda-roselle. Experimental design employed in this research was randomized complete design, analysis data with ANOVA. If the data showed significant results, it was further analyzed with DMRT. The result showed that the best proportion of morinda-roselle was 2:8 (w/w), with the consumer preference scores of colour, taste, and texture were 3.96, 4.28 and 4.20 respectively. The produced fruit leather had water content 8.25%, anthocyanin content 55.40 mg/100g, vitamin C content 11.60 mg/100g, total acid 10.69% as citric acid, fiber content 2.32% and texture 0.03 mm/g.dt, respectively. The best binding agent for making fruit leather was agar-agar with average score 4.20.

Q52 FOOD PROCESSING AND PRESERVATION

293 CAHYANTO, M.N.

Screening of *Lactobacillus plantarum* strains for ensiling. *Seleksi galur Lactobacillus plantarum untuk inokulum pada pembuatan silase/* Cahyanto, M.N.; Yuliasari, S.; Utami, T. (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Pertanian); Widyobroto, B.P. *AGRITECH* (Indonesia) ISSN 0216-0455 (2008) v. 28(1) p. 28-33, 3 ill., 3 tables; 25 ref.

MAIZE; LACTOBACILLUS PLANTARUM; FERMENTATION; SILAGE; SILAGE MAKING; FEED PROCESSING; PROGENY; TESTING.

Eleven strains of *Lactobacillus plantarum* have been evaluated for their growth rate and ability to reduce pH during corn ensiling. Ensiling was carried out in small scale using plastic bag for 14 days. Soluble carbohydrate consumption, organic acids production and pH reduction were measured during fermentation. The growth rate of each strain was also determined in liquid medium. All of the 11 strains of *L. plantarum* tested were able to improve the ensiling process. However, strains T-16, T-25 and S-98 grew in liquid medium faster than the others, and were able to reduce pH of silage quicker than the other strains. The pH of silage inoculated with strain T-16, T-25 and S-98 decreased from about 5.60 to 4.23, 4.45 and 4.40, respectively, in two days, and to 3.98, 4.05 and 4.03, respectively, after 14 days fermentation. The acetic acid content of silages inoculated with those strains was low. Strains T-16 and T-25 were suitable as potential as silage inoculants and their characteristics were comparable to the one isolated from a commercial silage inoculant.

Q54 FEED COMPOSITION

294 MANSYUR

Concentration of ammonia and volatile fatty acid of *Brachiaria humidicola* (Rendle) Schweick grass at various defoliation intervals (in vitro). *Konsentrasi amonia dan asam lemak terbang rumput Brachiaria humidicola (Rendle) Schweick pada berbagai interval pemotongan (in vitro)/* Mansyur; Djuned, H.; Tarmidi, A.R.; Dhalika, T. (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Peternakan); Abdullah, L. *Jurnal Ilmu Ternak* (Indonesia) ISSN 1410-5659 (2007) v. 7(1) p. 64-68, 2 ill., 22 ref.

FEED GRASSES; DEFOLIATION; CHEMICOPHYSICAL PROPERTIES; VOLATILE FATTY ACIDS; AMMONIA; IN VITRO EXPERIMENTATION

The existence of weeds significantly decreases rate of production and quality of herbage. Physically weed control by defoliation could be expected to sustain quality and production of herbage, and able to control weeds expansion. The aims of study were to find the effect of interval defoliation of *B. humidicola* that invated by *C. odorata* and its effect on concentration of ammonia and volatile fatty acid of *B. humidicola* herbage (in vitro). The experiment was conducted at Laboratory of Agrostology, Faculty of Animal Science Bogor Agricultural University. In vitro digestibility of herbage was analyzed at Ruminant Nutrition and Feed Chemistry Laboratory, Faculty of Animal Husbandry, Padjadjaran University. Split plot design in time was used in the field experiment. The treatments were nine different planting methods and different defoliation intervals. Defoliation time was divided on the first defoliation and the last defoliation. The result of experiment showed that concentration of ammonia and volatile fatty acid of herbage which defoliated every 60 days has significantly higher than those defoliated every 30 days and 90 days. Presence and defoliation of *C. odorata* did not affect concentration of ammonia and volatile fatty acid of *B. humidicola* herbage.

Q60 PROCESSING OF NON-FOOD OR NON-FEED AGRICULTURAL PRODUCTS

295 SAID, M.I.

Interaction of molds with fungicides at pickle and wet blue goat leather on physical property during storage time. *Interaksi kapang dengan fungisida terhadap sifat fisik kulit kambing pickle dan wet blue selama penyimpanan/* Said, M.I. (Universitas Hasanuddin, Makassar (Indonesia). Fakultas Peternakan). *Jurnal Ilmu Ternak* (Indonesia) ISSN 1410-5659 (2007) v. 7(1) p. 43-47, 2 ill., 2 tables; 10 ref.

ANIMAL PRODUCTS; LEATHER; POSTHARVEST TECHNOLOGY; CHEMICOPHYSICAL PROPERTIES; FUNGICIDES; MOULDS; STORAGE; KEEPING QUALITY; TIME

The study was conducted to assess molds interaction with fungicides at pickle and wet blue goat leather on physical property during storage time. *Aspergillus flavus* Link and *Penicillium sitophila* Mont isolates, six (6) wet blue and six (6) pickle leathers were used in this study. Each leather was split into 2 sides. Six samples were taken from each side. The statistical analysis was done by using 2 x 3 x 4 factorial of variance analysis (RCBD) with three replications and the storage time was used as block. There were two factors of leather, namely wet blue and pickle; three fungicides (control, Busan 1009 and Dodigen 262); and four storage duration of 1, 30, 60 and 90 days. The effects of fungicides of pickle were

highly significant (P<0.01) on tensile strength tester, and were significant (P<0.05) on elongated at break. There were no interaction between fungicides and molds. On wet blue leather, there were high significant (P<0.01) effect of fungicides and significant (P<0.05) of molds. No interaction between fungicides and molds on tensile strength tester and elongated at break. The pickle and wet blue leather contaminated by *Aspergillus flavus* Link and *Penicillium sitophila* Mont stored for 90 days without fungicides at room temperature enabled, the tensile strength tester and elongated at break properties can be maintained based on SNI standard.

296 SETYANINGSIH, D.
Effect of absorption and microwave oven drying to vanillin content in modified vanilla curing. *Pengaruh pengeringan absorpsi dan microwave oven terhadap kadar vanillin pada proses curing vanili termodifikasi*/ Setyaningsih, D. (Departemen Industri Pertanian, Jakarta (Indonesia)); Syarief, R.; Anggraini, F. *Buletin Teknologi Pascapanen Pertanian* (Indonesia) ISSN 1858-3504 (2009) v. 5(1) p. 47-55, 5 ill., 5 tables; 8 ref.

VANILLA PLANIFOLIA; VANILLIN; DRYING; ABSORPTION; MICROWAVE OVENS; DRIED FRUITS; CURING; PROCESSING; YIELDS.

Vanillin content of Indonesian cured vanilla is lower than its real potency. Attempt to increase its quality can be done by modifying the curing process. In this research, the modification is made by increasing the absorption of a-glucosidase activator namely butanol 0.1 M and cysteine 3 mM using vacuum and high pressure and also modified the vanilla drying. The vacuum infiltration technique 5 kPa during 10 minutes results enzyme activity and vanillin content higher than vacuum pressure 50 kPa, normal pressure and high pressure 100 and 150 kPa above normal pressure. Absorption drying cannot stabilize vanillin content which had been obtained from five days during first drying (1.0% dry weight). The cured vanilla obtained from absorption drying is 0.82% (dw). Drying with microwave oven also cannot stabilize vanillin content from five days drying. The content of vanillin was 0.49% (dw). Drying using oven 60°C during 3 hours per days exactly increases the vanillin content to 1.40% (dw). This value was higher than that obtained from curing standard method (Balitro II method). From this research it can be concluded that vanilla curing using absorption drying and also microwave oven did not suitable tobe applied.

Q70 PROCESSING OF AGRICULTURAL WASTES

297 HIDAYAT, T.
Formulation of varnish from phenolic resin of cashew nut shell liquid distilates. *Formulasi vernis berbasis resin fenolik dari destilat cairan kulit biji mete*/ Hidayat, T. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)); Sailah, I.; Suryani, A.; Sunarti, T.C.; Risfaheri. *Buletin Teknologi Pasca Panen Pertanian* (Indonesia) ISSN 1858-3504 (2009) v. 5(1) p. 1-8, 2 ill., 4 tables; 21 ref.

ANACARDIUM OCCIDENTALE; CASHEW; RESIN; LIQUIDS; SHELL; SEED; VARNISHES; PROCESSING.

Phenolic resins from CNSL distillate is a product polymer which obtained from formaldehyde and CNSL distillate reaction. This resin can be used for surface coating such as paint, varnish, and enamel. The objective of this research was to determine the suitable ratio of phenolic resins from CNSL destillate to drying oil for interior and exterior varnish

formulation. The treatments consisted of 4 different ratios of phenolic resin to drying oil (w/v), i.e. 1:0; 1:0.5; 1:1; and 1:1.5 using completely randomized design with three replications. The result showed that the addition of drying oil (linseed oil) in varnish formulation gave significant effect on varnish film properties (hardness, flexibility, glossy, and resistancy to water). Other varnish film properties, such as volatile matter content and specific gravity was not significantly affected. The best varnish formula was obtained from the ratio of phenolic resins to drying oil of 1:1. This formula had volatile matter content of 59.9% with 0.899 g/ml specific gravity. Touch-dry and hard-dry of film varnish were 1.8 and 5.8 hours, respectively, with 60.9% of glossiness of film after weather test. These parameters met the quality standard of type A varnish (for interior and exterior varnish). Besides, varnish formula had film properties with 3H hardness, empty set 3 mm flexibility, 5B adhesion, and resistant to water. In general, the varnish film had similar properties to the commercial varnish K1 (interior and exterior varnish) and better properties than commercial varnish K2. The best varnish formula is prospectively applied for interior and exterior wood varnish.

298 SUMANGAT, D.

Technical and economical study on processing of briquette of jatropha oilseed cakes for energy source of stove. ***Kajian teknis dan ekonomis pengolahan briket bungkil biji jarak pagar sebagai bahan bakar tungku***/ Sumangat, D.; Broto, W. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Buletin Teknologi Pascapanen Pertanian* (Indonesia) ISSN 1858-3504 (2009) v. 5(1) p. 18-26, 2 ill., 4 tables; 18 ref.

JATROPHA CURCAS; SEED; BYPRODUCTS; PROCESSING; ENERGY SOURCES; ECONOMICAL ANALYSIS; BRIQUETTES; STOVES; CHEMICAL ANALYSIS

Jatropha oilseeds cakes are considered as by-product of jatropha oil extraction process which could have potential usage as energy source for traditional stove primarily due to residual oil left in the cakes. The objective of this experiment was to obtain suitable type and concentration of binder used for producing briquette and to evaluate the performance of briquette as energy source of traditional stove. Economical analysis was conducted to calculate its feasibility as energy sources compared to kerosene. Production of briquette follow some processing steps, i.e. grinding, 40 mesh screening, mixing with binders, briquetting and drying at 60°C for 24 hours. Treatments tested were A) type of binders (A1 = tapioca and A2= cassava flour) and B) concentration of binders (B1=1%, B2=2%, B3=3%, B4= 4% and B5= 5%). Experimental design used was factorially completely randomized with three replications. Parameters measured were percentage of water, oil, ash and volatile substance contents, calorific value (cal/g), density (g/cm^3) and pressure strength (g/cm^2). Parameters observed on performance evaluation of briquette energy source for stove were burning rate (g/min) and color flame (visually). The results showed that usage of binders either tapioca or cassava flour did not significantly affect all parameters observed, except on water content of briquette. Concentration of binders had not significantly effect on parameters observed. Tapioca binder with 4% concentration showed the best results based on water content, pressure strength and average burning rate. The average burning time of briquette was 131 minutes with yellowish flame color.

U10 MATHEMATICAL AND STATISTICAL METHODS

299 ANANG, A.

Mathematical models for egg production curve in broiler breeder parent stock. ***Model matematika kurva produksi telur ayam broiler breeder parent stock/*** Anang, A.; Indrijani, H.; Sundara, T.A. (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Peternakan). *Jurnal Ilmu Ternak* (Indonesia) ISSN 1410-5659 (2007) v. 7(1) p. 6-11, 5 ill., 3 tables; 10 ref.

BROILER CHICKENS; EGGS; EGG PRODUCTION; ANALYTICAL METHODS

Egg production built a curve with a certain mathematical model. This research was held to find out the best mathematical model to describe egg production curve in broiler breeder parent stock Cobb 500 at the age of 24-45 weeks. The mathematical models evaluated in this research were Mc Millan model, Yang model, Logistic model, and Adams-Bell model. The Adams-Bell model with the formula of (see in the text) coefficient of determination (R1) of 0.9998, coefficient of correlation (r) of 0.999, and standard error (SE) of 1.060. By using this model, the egg production curve from the age of 24-45 weeks is able to be estimated.

300 RAHMAT, D.

Growth curve model of tegal duck until eight weeks ages. ***Model kurva pertumbuhan itik tegal jantan sampai umur delapan minggu/*** Rahmat, D.(Universitas Padjadjaran, Bandung (Indonesia). Fakultas Peternakan). *Jurnal Ilmu Ternak* (Indonesia) ISSN 1410-5659 (2007) v. 7(1) p. 12-15, 2 ill., 4 tables; 8 ref.

DUCKS; MALE; ANIMAL PERFORMANCE; ANALYTICAL METHODS; GROWTH

The aim of this research was to predict growth curve model of tegal duck until eight weeks ages. The research used 120 heads duck, divided into 3 groups, each group fed the ration contains 17%, 19% and 20% protein, with 2,800 kcal/kg ME. Scatter plots data is used for estimated determination coefficient (R^2) and residual mean square (S^2). The result showed that; (1) protein level on ration was not significant for growth rate, (2) growth curve model was allometric: $Y = 46.9570 (X+1)^{1.5668}$.

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